THE AEROPLANE and ASTRONAUTICS

SEPTEMBER 30, 1960

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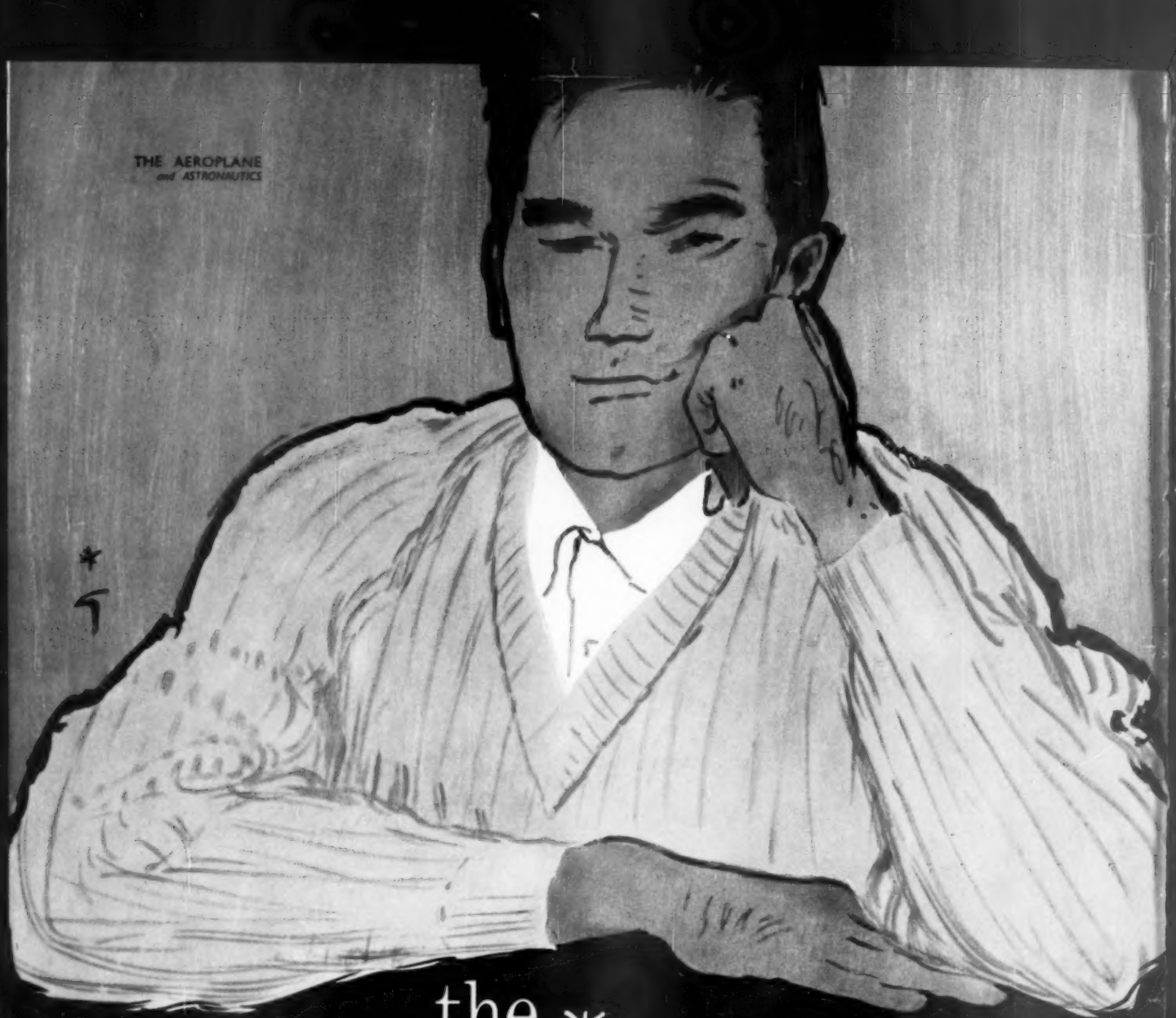

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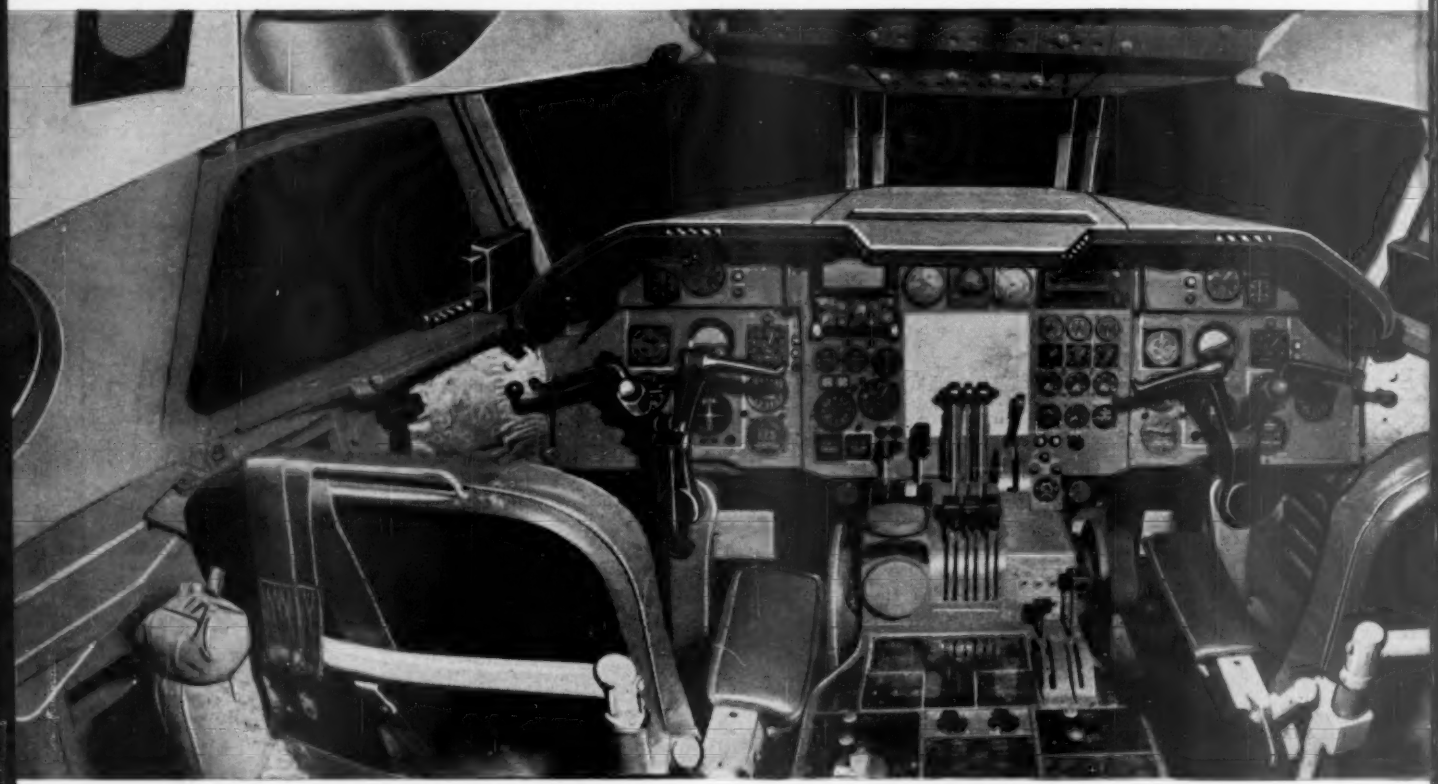

This is a mock-up of the BEA de Havilland 121 cockpit. Smiths equipment has been specified to provide automatic flare control when the aircraft enters service. Smiths S.E.P. 5 automatic pilot (the pilot's controller is in the bottom centre of the picture) operates on the Multiplex principle and will, ultimately, provide full automatic landing facilities to civil safety standards. Smiths Para Visual Director (P.V.D.), a revolutionary flight director display, can be seen around the panel coamings. In the D.H. 121 Smiths P.V.D. will operate in conjunction with the new Smiths integrated Flight System, specifically designed in conjunction with BEA to fit the 121's operational role.

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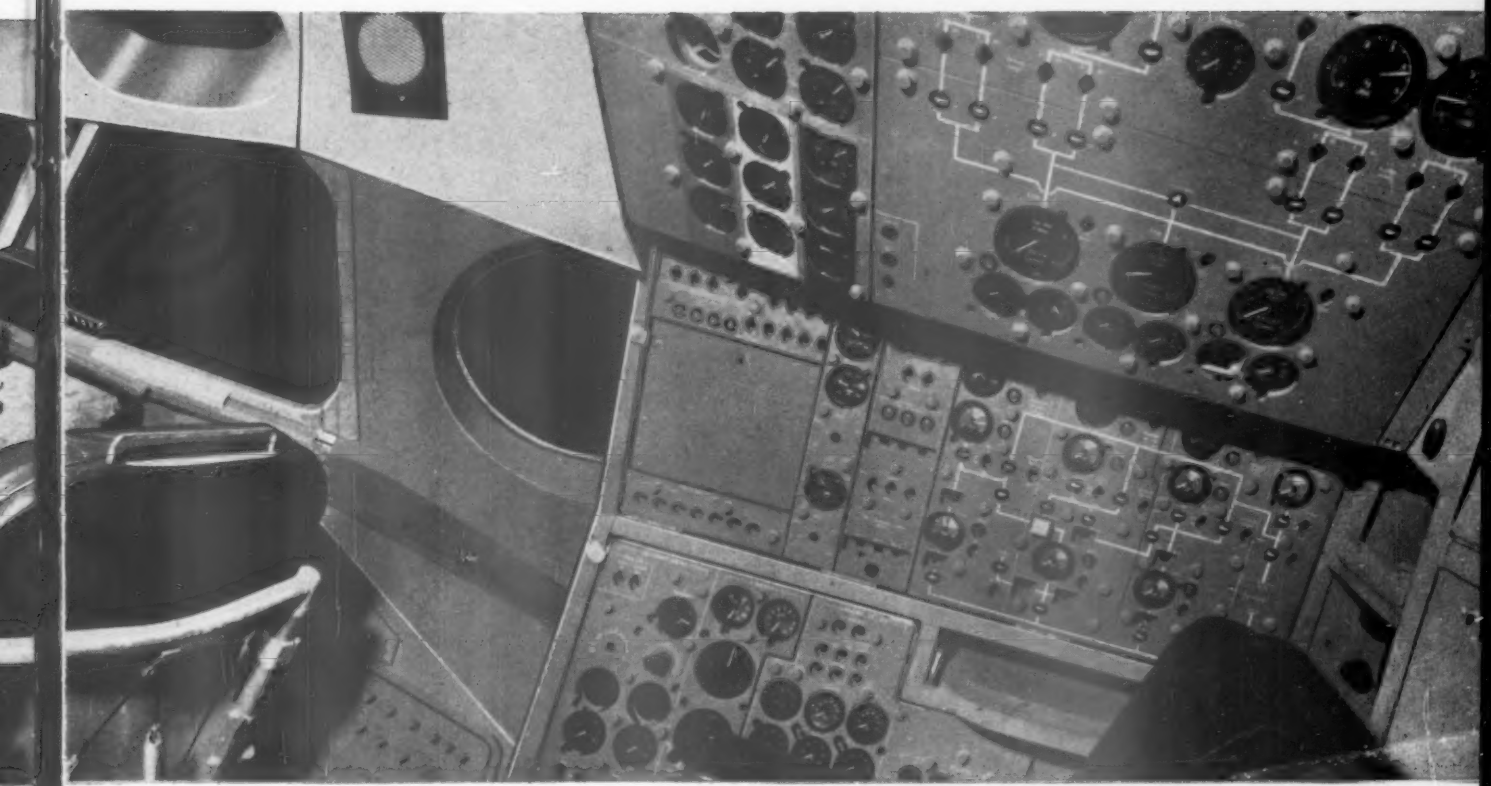

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VOLUME 99 NUMBER 2554 SEPTEMBER 30, 1960

Why do they Wither Away?

With much of the ballyhoo of a political convention and plenty of pretty girls to encourage the photographers to photograph the military exhibits as effective background, the U.S. Air Force last week set out its powerful and fantastically expensive case for substantial public support in a convention at San Francisco. Our reporter on the spot specifically warns against allowing the ballyhoo to diminish the importance one attaches to the proceedings.

What the U.S.A.F. proposes is not only of interest to the Russians, it must be of interest and significance to every thinking person in aviation. For two reasons, first because the possibility of living in a free democracy depends on the power of the U.S.A.F. to deter the Russian Air Fleets and second, because the technical decisions must be of interest to those of us who believe that the Royal Air Force still has a part to play amid the hurricanes of change that roar about the World.

Going straight to the second point the U.S.A.F. generals make no bones about the significance of space. Who controls access to and exit from space dominates the World. This is doctrine. There is no waffle about possible scientific benefits to be gained by sending up sounding rockets.

In this country there is no officially announced interest in space as an exercise ground for the Royal Air Force. To those who have always held that Exercise Prospect was the salvation of the Royal Air Force in focusing attention on the need for continuing to develop manned military aircraft, we commend the observations of Lieut.-General Schriever who has achieved prominence as the driving force behind the U.S.A.F. missile programme.

He has no doubts about the need for manned aircraft. As he says "the aircraft is not on the way out, it is just on the way in."

We hear a good deal in this country about the purpose of the deterrent being to prevent the outbreak of a nuclear war. The corollary that if there is an outbreak of war the deterrent will have failed is given much currency here also. We much prefer the outspokenness of General T. D. White, U.S.A.F. Chief of Staff, who said at the convention that "effective deterrence includes the possession of military forces to deter war and should war occur, the military strength to prevail. . . . If deterrence fails and a nation must fight, it wants—and must have—the strength to win."

As our report makes clear, the U.S.A.F. is interested in variable-geometry wings and boundary layer control to achieve enhanced performance by means of laminar flow. Work has been going on in this country in a desultory sort of way since research in this field was started by private enterprise in 1938 or earlier. As for the Swallow wing of Dr. Barnes Wallis, we have been hearing for years why this project cannot work.

It seems extraordinarily disheartening that the right ideas come to light in this country, but somehow they never grow to full height. It cannot be for lack of Government advisers; there are more of them than ever before in our history.

Editor - - - - THURSTAN JAMES
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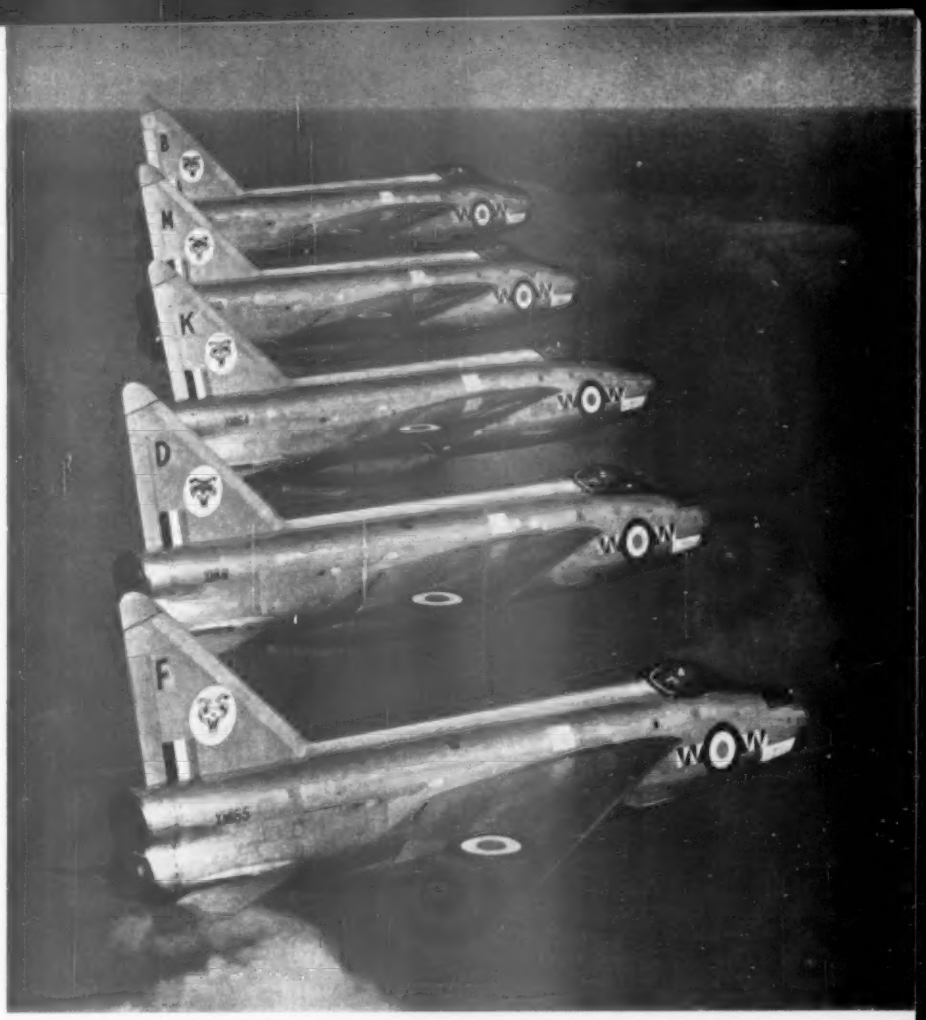

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Six non-competitors, all in Skylark 3s, went in for a race to Duxford and back. Roger Mann, who won with a 2 hr. 20 min. flight, earned a tankard and a year's subscription to THE AEROPLANE AND ASTRONAUTICS.

Mr. Geoffrey Ripon, Parliamentary Secretary to the Ministry of Aviation, presented the prizes, which included £50-worth of money prizes donated by Mr. J. B. Emmott, of Kenilworth. The London Gliding Club organized the meeting.—A.E.S.

Sir Matthew Joins the A.R.B.

FOLLOWING the resignation of Sir George Cribbett, Sir Matthew S. Slattery, chairman of B.O.A.C., has been appointed a member of the Air Registration Board. He was unanimously nominated by British operators, and joins Group I (Operators) on the Council of the Board. The other serving members of this group are Lord Douglas of Kirtleside, Mr. J. Eric Rylands and Col. R. L. Preston.

Members of the Council are appointed for a four-year term, retiring in rotation on Dec. 31 of each year. They serve in one of four groups—operators, constructors, insurers and independent. A representative of professional pilots is appointed to the Board by the Minister. At the present time, the Council comprises the following members in addition to the four members of Group I mentioned above: Sir Aubrey Burke, Messrs. E. R. H. Hill and R. H. Jennens, Capt. E. C. Miles and Messrs. J. D. Nash, A. A. Rubbra, J. J. Taylor and C. F. Uwins. The four vice-chairmen are Messrs. Guy F. Johnson and A. B. Stewart, Major R. H. Thornton and Sir Harold Roxbee Cox. Lord Brabazon is chairman.

Progress with the TSR-2

IN an uncompromisingly bald statement last week, the Ministry of Aviation announced the imminent placing of a development contract for the TSR-2 "Canberra-replacement" aircraft.

Subject to the satisfactory conclusion of negotiations," the statement reads, "a contract for the development of the TSR-2 aircraft for the Royal Air Force will shortly be placed with the British Aircraft Corporation. The initial phase of project design and programming has gone according to plan and is virtually complete."

No information was given as to whether the contract will involve anything more than a prototype—although, presumably, following recently established practice, a small batch of pre-production aircraft would in fact be envisaged. Likewise there have been no disclosures regarding the layout of the aircraft or details of the equipment it will need to carry in order to accomplish its specialized tasks.

It is interesting to recall that the first official statements concerning the TSR-2 were made in the House of Commons in December, 1958. The Secretary of State for Air, in answer to questions, announced that it had been decided to develop a new strike/reconnaissance aircraft to replace the Canberra. The new aeroplane, he said, would be capable of operating from small airfields with rudimentary surfaces and would have a very high performance at all levels. These not-very-revealing observations naturally led to a great deal of speculation, particularly concerning the possible powerplant and the likelihood of true VTOL capability.

Almost immediately afterwards the then Minister of Supply revealed that development of the new aircraft would be undertaken jointly by Vickers-Armstrongs and English Electric with the former having the main contract and the work shared between the two companies on a fifty-fifty basis. The Minister went on to explain that the specification for the TSR-2 had originally been based on a General Operational Requirement—OR.339—but that in the course of study it had been found technically possible to incorporate in the final OR. modifications "which will greatly increase the usefulness of the aircraft in limited operations and for close support of the Army—particularly by reducing the length and strength of runways required for take-off."

At the same time he disclosed that development of the powerplant for the TSR-2 would be undertaken by Bristol Siddeley Engines. And a subsequent statement by that company indicated that this would be a later version of the Olympus.

A month later, Parliamentary questions elicited a few more sparse facts about the R.A.F.'s new aircraft from the Secretary of State. Compared with the Blackburn NA39 low-level strike aircraft for the Royal Navy, the TSR-2 would be more advanced and have a slightly different role. Its take-off and landing run would be much shorter and it would have better facilities for blind-navigation over land. It would be supersonic but not capable of VTOL operation; short runways and semi-prepared surfaces were again mentioned. The range of the aircraft would be "substantially greater" than that of the American Mace flying bomb [which is more than 650 miles—ED.] So far as the time scale was concerned it was said that the TSR-2 would enter service by about 1964-65.

Since these statements were made, although there has been considerable speculation about the aircraft and its capability, no new hard facts have come to light. Bristol Siddeley has revealed the existence of an Olympus 21 with a Solar reheat system and capable of delivering a static thrust in the region

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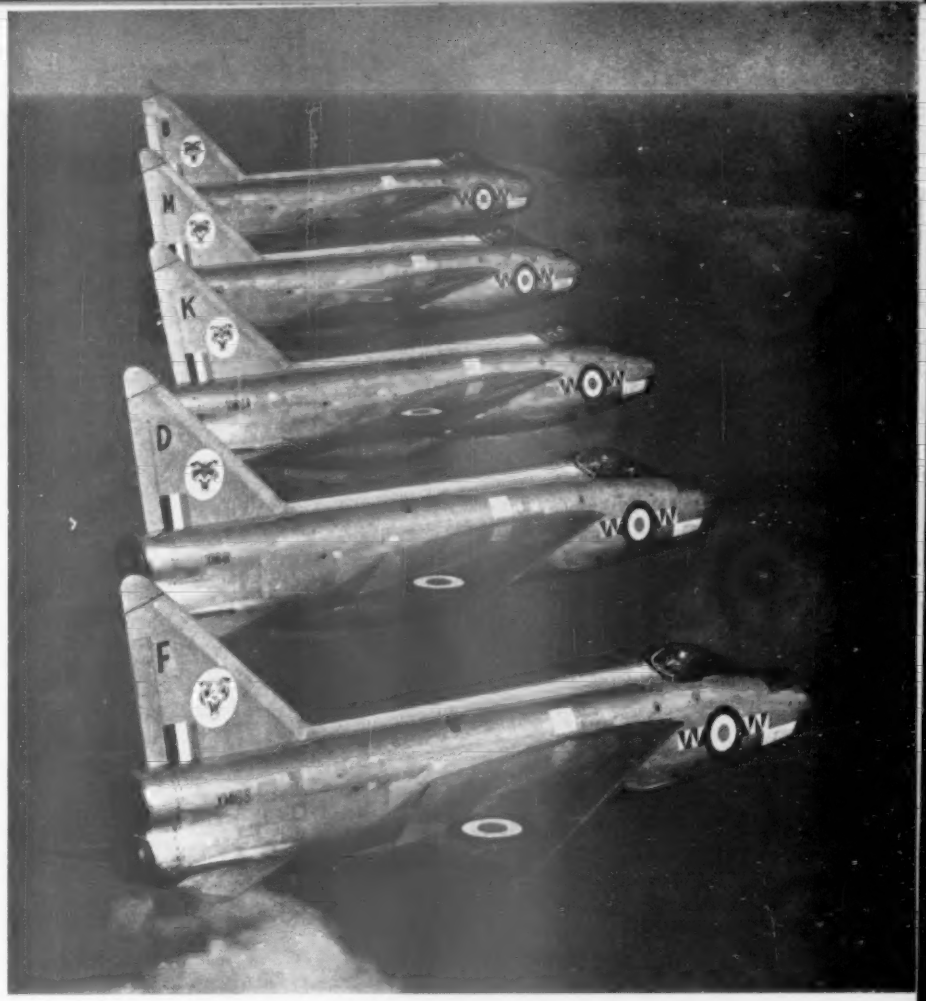

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Douglas Bridson, who was awarded the Jack Hanks Trophy as well as 1st prize, shot up into a stall and down into a spin within seconds of releasing the cable. He lost no time between manœuvres and, by landing 16 ft. from a target in the shape of a paper cone, also won the spot-landing competition, which every pilot tried for at the end of his flight, though the result did not count for aerobatic marks. Dan Smith, of the London Club, in a Swallow, won second prize. The third went to Master Pilot H. E. K. Poole, from R.A.F. Bicester, who discarded engines less than a year ago for the first time.

Six non-competitors, all in Skylark 3s, went in for a race to Duxford and back. Roger Mann, who won with a 2 hr. 20 min. flight, earned a tankard and a year's subscription to THE AEROPLANE AND ASTRONAUTICS.

Mr. Geoffrey Ripon, Parliamentary Secretary to the Ministry of Aviation, presented the prizes, which included £50-worth of money prizes donated by Mr. J. B. Emmott, of Kenilworth. The London Gliding Club organized the meeting.—A.E.S.

Sir Matthew Joins the A.R.B.

FOLLOWING the resignation of Sir George Cribbett, Sir Matthew S. Slattery, chairman of B.O.A.C., has been appointed a member of the Air Registration Board. He was unanimously nominated by British operators, and joins Group I (Operators) on the Council of the Board. The other serving members of this group are Lord Douglas of Kirtleside, Mr. J. Eric Rylands and Col. R. L. Preston.

Members of the Council are appointed for a four-year term, retiring in rotation on Dec. 31 of each year. They serve in one of four groups—operators, constructors, insurers and independent. A representative of professional pilots is appointed to the Board by the Minister. At the present time, the Council comprises the following members in addition to the four members of Group I mentioned above: Sir Aubrey Burke, Messrs. E. R. H. Hill and R. H. Jennens, Capt. E. C. Miles and Messrs. J. D. Nash, A. A. Rubbra, J. J. Taylor and C. F. Uwins. The four vice-chairmen are Messrs. Guy F. Johnson and A. B. Stewart, Major R. H. Thornton and Sir Harold Roxbee Cox. Lord Brabazon is chairman.

Progress with the TSR-2

IN an uncompromisingly bald statement last week, the Ministry of Aviation announced the imminent placing of a development contract for the TSR-2 "Canberra-replacement" aircraft.

Subject to the satisfactory conclusion of negotiations," the statement reads, "a contract for the development of the TSR-2 aircraft for the Royal Air Force will shortly be placed with the British Aircraft Corporation. The initial phase of project design and programming has gone according to plan and is virtually complete."

No information was given as to whether the contract will involve anything more than a prototype—although, presumably, following recently established practice, a small batch of pre-production aircraft would in fact be envisaged. Likewise there have been no disclosures regarding the layout of the aircraft or details of the equipment it will need to carry in order to accomplish its specialized tasks.

It is interesting to recall that the first official statements concerning the TSR-2 were made in the House of Commons in December, 1958. The Secretary of State for Air, in answer to questions, announced that it had been decided to develop a new strike/reconnaissance aircraft to replace the Canberra. The new aeroplane, he said, would be capable of operating from small airfields with rudimentary surfaces and would have a very high performance at all levels. These not-very-revealing observations naturally led to a great deal of speculation, particularly concerning the possible powerplant and the likelihood of true VTOL capability.

Almost immediately afterwards the then Minister of Supply revealed that development of the new aircraft would be undertaken jointly by Vickers-Armstrongs and English Electric with the former having the main contract and the work shared between the two companies on a fifty-fifty basis. The Minister went on to explain that the specification for the TSR-2 had originally been based on a General Operational Requirement—OR.339—but that in the course of study it had been found technically possible to incorporate in the final OR. modifications "which will greatly increase the usefulness of the aircraft in limited operations and for close support of the Army—particularly by reducing the length and strength of runways required for take-off."

At the same time he disclosed that development of the powerplant for the TSR-2 would be undertaken by Bristol Siddeley Engines. And a subsequent statement by that company indicated that this would be a later version of the Olympus.

A month later, Parliamentary questions elicited a few more sparse facts about the R.A.F.'s new aircraft from the Secretary of State. Compared with the Blackburn NA39 low-level strike aircraft for the Royal Navy, the TSR-2 would be more advanced and have a slightly different role. Its take-off and landing run would be much shorter and it would have better facilities for blind-navigation over land. It would be supersonic but not capable of VTOL operation; short runways and semi-prepared surfaces were again mentioned. The range of the aircraft would be "substantially greater" than that of the American Mace flying bomb [which is more than 650 miles—ED.] So far as the time scale was concerned it was said that the TSR-2 would enter service by about 1964-65.

Since these statements were made, although there has been considerable speculation about the aircraft and its capability, no new hard facts have come to light. Bristol Siddeley has revealed the existence of an Olympus 21 with a Solar reheat system and capable of delivering a static thrust in the region

Matters of Moment . . . .

of 33,000 lb.; this has been said to represent "a stage in the development of a reheat Olympus for the TSR-2." It would, incidentally, be reasonable to suppose that the company's experience with the BS53 VTOL engine would be put to good use in devising a method of jet deflection for STOL operation.

The aircraft's speed has been forecast as being in the Mach 2 category at altitude. It has been suggested, too, that its special low-flying capabilities are made possible by some form of contour-following automatic control system. And an official B.A.C. statement has indicated that the project work and programming has been done at Weybridge and Warton, while production of components will be at Weybridge and Preston.

At all events, last week's Ministerial pronouncement has made it clear that recent rumours to the effect that the TSR-2 project was to be abandoned, were no more than rumours. Perhaps that was its principal purpose for it hardly differs in essence from the initial statement made by the Minister of Supply last January. Indeed the only "news" contained in this latest statement would seem to be the comment regarding virtual completion of the project design and programming. This may be taken to imply that production of actual "hardware" is about to be put in train. Presumably, too, it may be taken to suggest that even though a certain amount of re-appraisal of the specification and the project may have taken place, it has had no effect—so far at any rate—on the time scale of this important new aircraft for the Royal Air Force.

"Sos" Cohen

WING COMMANDER LIONEL COHEN, D.S.O., M.C., D.F.C., known for some elusive reason as "Sos," has passed away in bed at 85, after surviving the most incredible adventures. His crowded life began with the fighting against the Matabeles in 1893, went on with the Boer War and into the 1914 War. Somehow he got himself into Coastal Command in the last big war, as a liaison officer with the Navy. Using this as a lever, he flew as often as he could, as an aid to improving the lot of aircrew by studying combat conditions on the spot. After 70 operational flights and in his 70th year, he was awarded the D.F.C.

Marshal of the R.A.F. Sir John Slessor, in his foreword to Anthony Richardson's book about "Sos" Cohen's life, "The Crowded Hours," says "I don't suppose it has fallen to the lot of many Commanders-in-Chief to have on their staff a relatively junior officer wearing on his chest the ribbon of a medal awarded for a campaign that took place before he (the Commander-in-Chief) was born! But so it was with Sos Cohen. . . . I have never put up a recommendation for a D.F.C. that I thought more well deserved than for old Sos in his 70th year. A wonderful culmination to a life of daring adventure."

In between wars, he had been a tramp, waiter, newspaper owner and reporter, mineral prospector, secret agent, private army commander, racehorse breeder, rich man and pauper. I can't help feeling that he would have liked to have finished up by crashing in a space vehicle on the Moon.—WREN.

Jimmy Jeffs—a Vivatuary

G. JAMES H. JEFFS, C.V.O., O.B.E., holder of Air Traffic Control Licence No. 1, retires at the end of this month in the way that most of us would like to retire, at the top of his profession. He practically invented the A.T.C. business, made it work, spent 40 years with it and since 1956 has been London Airport's Commandant. Or, if you like, stationmaster of Britain's biggest, busiest and most international station, a definition contrived so that I can suggest that stationmastering is in the Jeffs' blood, for Jimmy's father was, in the century's early years, stationmaster at Nuneaton on the old L. & N.W. Railway. However, the tradition has not been maintained by the third generation, for son Ray Jeffs is in aviation insurance and an A.R.B. member, while his brother Alan is a principal scientific officer at R.A.E.

Their father, born in 1900, just caught the 1914-18 War, qualifying for the R.N.A.S. with the splendid title of Marine Observer, in airships and Short seaplanes, which demanded a knowledge of wireless, navigation, gunnery and pigeons. The War over, Jimmy went to Air Ministry for three years, putting his foot on the lowest (and at that time, the only) rung of the A.T.C. ladder. Under Sefton Brancker, he studied control, telecommunications and met. services, moving in 1923 to Croydon where in the 8 ft. square control tower, the World's first Air Traffic Control was set up. Communication with aircraft was achieved by the then new R/T and by W/T. It was quite possible to maintain two-way communications even then with aircraft over the Continent, and D/F fixes could be passed to a pilot in 30 seconds and a radio bearing in five seconds, from RD/F stations located at Croydon, Lympne and Pulham.

In his A.T.C.O. capacity Jimmy played an increasingly important part in the nation-wide spread of these facilities; then he spent three years in the Heston tower before going to the Ministry's A.T.C.O. School in 1937 as Chief Instructor. The following year he was appointed Supt., A.T.C.

He served with the R.A.F. during World War II, when he was C.O. Trans-Atlantic Air Control, Prestwick, and later went to H.Q. Ferry Command, Montreal. For his services as British chairman, N. Atlantic Control Board, he was awarded the U.S. Legion of Merit and received the O.B.E. for his wartime service with Air Traffic Control—or Flying Control, as the R.A.F. called it. He left the Service with the rank of Group Captain.

For the past 10 years he has been Airport Commandant, six years at Prestwick and four at London, where his organization of more than 500 Royal departures and arrivals earned him an M.V.O., later elevated to C.V.O. He attributes the excellent safety record of London Airport to his staff and to the full co-operation given by the pilots based there.

One of his associates since the earliest days is John Sutton, now Waterguard Superintendent, H.M. Customs, Metropolitan Airports. John recalls when, as a new Preventive Officer at Croydon more than 30 years ago, he met Jimmy for the first time in Nancy's bar in the Airport Hotel and got the advice "You should study the Customs side of aviation—it's going to be quite something." There are now 160 P.O.s at London Airport alone.

Drawing attention to the 8,500 passengers, the equivalent of six "Queens," who arrive daily, Jimmy commented: "We handle 90 jets a day now—it'll be 150 a day by next May." He regretted the Airport's increasingly inadequate facilities to deal with the growing passenger and freight traffic, with "that tunnel" as a limiting factor. He reckons the airport should be taken out of the uncommercial and unenterprising hands of the Civil Service and run along the lines of Idlewild's Port of New York Authority.

Jimmy Jeffs is a man of active, progressive aviation and only very, very incidentally a Civil Servant. Perhaps that is why no knighthood marks his 40 years of service to civil and military aviation.

On London Airport's broad Heath Row acres, the Commandant enjoys the shooting rights and lives in official, and noisy, residence at Longford. When out shooting over the airport's western bird-country, the Commandant could be contacted from the control tower through the R/T installed in both his official and private cars.

His burly figure will still be seen among the officials attending Royal comings and goings, for B.O.A.C. have retained him on a part-time basis to advise and assist at such airport functions. And other activities in prospect will ensure that Jimmy Jeffs will continue to circulate among his many friends in aviation.—WREN.

Progress Report on Skybolt

Santa Monica, Calif., Sept. 21

BOTH R.A.F. and U.S.A.F. bomber squadrons are to be operational with Skybolt air-launched ballistic missiles in 1964 according to statements issued by the Douglas Aircraft Co., Santa Monica, on Sept. 20 when detailed official information on the Skybolt weapon system was given for the first time. This missile will be air-launched from U.S.A.F. B-52 or R.A.F. Vulcan bombers at targets up to 1,000 naut. miles away.

Background

Formal U.S.A.F. design studies for an ALBM were begun in 1957. They aimed at producing a missile which would enable bombers to remain in service as an effective weapon at a time when those armed with Hound Dog ASMs might be unable to make effective attacks. Other advantages foreseen for such a weapon system were: its ability to remain aloft within a relatively short distance of enemy territory; its flexibility; its invulnerability to destruction by ICBMs or IRBMs; and its value as a deterrent because its position could not be pin-pointed by any likely enemy.

Fourteen companies took part in the ALBM design studies for the U.S.A.F. which began in October, 1957. In 1958 and early 1959 three design teams received feasibility contracts covering the construction of ballistic-type vehicles, which were successfully air-launched. The teams were McDonnel, with a boost-glide vehicle; Martin with a ballistic vehicle; and a joint Convair-Lockheed team, also with a ballistic vehicle.

As a result of this work there was a design competition for an operational ALBM and Douglas was awarded a contract to develop a missile of this type in May, 1959. As the prime contractor Douglas gave sub-contracts for propulsion to Aerojet-General in August, 1959, for the re-entry vehicle to General Electric in September, and for the guidance system to the Nortronics Division of Northrop in October. Douglas received the go-ahead from the U.S.A.F. for hardware development on Feb. 5 this year.

On the U.S.A.F. side the Skybolt programme is being handled by the Wright Air Development Division, at Dayton, Ohio, and not by the Ballistic Missile Division which has been responsible for the IRBM and ICBM programme from the very start. Observers from the United Kingdom watched the evaluation of proposals and there are now 34 British representatives at Dayton; there will also soon be five at Douglas.

In working out the programme for Skybolt certain requirements have been insisted upon. All design planning and tooling is for production missiles. So far as possible stages of the programme are being developed concurrently to ensure a short development period. Thus there is simultaneous work on missile system design, ground-support equipment, training programmes and operational planning. Emphasis is being placed on reliability and easy maintenance of the system.

All parts of the missile system are being designed so that they are compatible with the two main weapon carriers, the B-52 and the Vulcan. The aim has been to make the greatest possible use of existing aircraft equipment and to add only new equipment which is absolutely essential for the performance of the missile system.

Incidentally, Douglas also studied the application of Skybolt to the Handley Page Victor. Low ground clearance would have caused difficulties, but not insoluble problems. The decision not to install the missile in Victors was solely a British one.

Other aircraft which have been considered as Skybolt carriers are the B-70 and KC-135; notable omissions are the B-58 and British turbojet transports, such as the Vickers VC 10.

Operation

The manner of using Skybolt can be illustrated by describing a typical mission.

On the ground the missile is attached to the aircraft and checked out by its ground equipment. The fact that a missile is carried does not affect the time which the aircraft needs to take off when a "scramble" is ordered.

When airborne the missile system does not operate until an attack order is received. Aircraft and missile computers and guidance are then switched on and become effective after a short "settle-down" period, with information being fed to the missile.

At launch the missile is dropped in a horizontal attitude. After falling free the first-stage motor ignites and drives the missile ahead of the aircraft and in a programmed pitch-up into a ballistic trajectory; during this stage it is probably aerodynamically controlled by moving fins.

Following first-stage burn-out, the second stage separates and ignites. Guidance is effective only during second-stage burning and is probably applied via jet deflection. At the appropriate point the guidance system cuts the engine thrust and the nose-cone separates and travels over a ballistic trajectory to the target.

The target need not be in the line of flight of the launch aircraft; it can be up to 45° on either side, although this implies a range penalty of about 150 miles on a full-range shot. This penalty decreases as the deviation becomes less.

There is no limit on launch altitude, but the lower the altitude, the greater the reduction in range.

Systems

To ensure that the development of Skybolt meets tight schedules, all parts of the missile system rely on proved techniques. The aim has been to stick to "the existing state of the art"—no new breakthroughs are needed.

In the aircraft itself existing bombing and navigation systems are used to supply basic information to a pre-launch computer; this supplies position information and velocities along three axes to the missile-borne systems. Thus the only new equipment on the aircraft is this computer, which is designed using proved techniques.

Use of existing bombing and navigation systems suggest that missiles will be launched only over predetermined points, and not at any point in an aircraft's patrol area.

The main control equipment on the missile is the guidance computer, which is similar to that used in the Polaris, and the inertial platform which closely resembles the one developed for Thor. Design of the guidance system inside the missile is much simpler than for an ICBM because the range is only 1,000 miles compared with more than 5,000 for the ICBM.

On the propulsion side the missile makes use of existing propellents and case materials of the type already developed for Polaris and Minuteman. Engine size is no problem, as engines of the size needed have been thoroughly developed. Missile structure is conventional. The re-entry problems are similar to those which have already been solved for IRBMs; they are much less exacting than for ICBMs. Ground-handling and ground-support electronic equipment are based on existing U.S.A.F. equipment which needs only slight modification for this role.

Programme

An ALBM development programme passes through a sequence of stages. First comes the fixing of the missile configuration. Then there is the production of a missile mock-up followed by an aircraft-missile integration mock-up. The next stage is engine testing. Skybolt has now passed through these stages; several successful engine tests have been made, although obviously many more will be done. Although these development stages are listed consecutively, many overlap to a considerable extent.

Later stages, which have not yet been reached in Skybolt development, are sled tests of the guidance system; dummy drop tests; flight tests in which manœuvres will follow a predetermined programme; captive flight tests during which the serviceability and effectiveness of the guidance will be checked under aircraft flight conditions; and finally flight trials with guidance systems effective. It is at the flight-trial stage that the most baffling development problems are likely to arise. Allowance has been made in the programme for possible delays at this stage.

Skybolt has been given the same development priority as other U.S. ballistic missiles. A strong range of industrial teams is working on the missile. Avco and Boeing are associate contractors to Douglas; they are responsible for the compatibility of the Vulcan and B-52 with the missile system. As already mentioned, the major sub-contractors are Nortronics, General Electric and Aerojet General.

Douglas plants at Santa Monica, El Segundo and Tulsa are working on Skybolt, as are Aerojet-General, Sacramento; Nortronics of Hawthorne; Boeing at Wichita; Bell at Buffalo; General Electric at Utica and Philadelphia; Bendix at Teterborough; Kearfott at Little Falls, and IBM at Oswego.

High-level attention is being devoted to the Skybolt programme to ensure that it is kept on schedule. A policy committee devoted to the missile at Douglas is headed by the company president, Donald W. Douglas, Jr.

The Skybolt programme is still in its early days. However, the use of proven techniques and the excellent Douglas record on the Thor programme make it very unlikely that there will be any slip in the overall programme.—J. R. COWNIE.

San Francisco, September 24

U.S. AIR FORCE STATES ITS PLANS FOR NEXT STAGE

Manned Spacecraft and Missiles

NO argument about the relative merits of manned aircraft and missiles troubles the United States Air Force; it is developing both types of weapon and, for good measure, is also working on a wide range of space systems.

"The aircraft is not on the way out, it is just on the way in," says Lt.-Gen. B. A. Schriever, commander of Air Research and Development Command, who is best known for his work on U.S. ballistic-missile programmes.

A thorough series of reports on the latest U.S.A.F. thinking was given at the Air Force Association convention in San Francisco between Sept. 20 and 24.

Formed in 1946, the A.F.A. aims "to assist in obtaining and maintaining adequate air power for national security and world peace; to keep A.F.A. members and the public abreast of developments in the field of aviation."

At its convention the A.F.A. carries out these aims by arranging a series of briefings by commanders of all the top U.S.A.F. commands, as well as by discussions involving the aircraft industry—or aerospace industry as it is now known in the U.S. In addition there is a large static exhibition.

Common trends and some contradictions emerged from the briefings by top U.S.A.F. commanders. All are agreed on the need for a combined deterrent force of aircraft and missiles; all feel that the U.S.A.F. must go into space. It is argued that the nation which can control or deny access to space will control the world.

The argument is that naval power was originally dominant, and that air power then gave access to the hinterland. Space systems will give access to land, sea, air and other bodies in space; whoever controls space "will dominate the power situation."

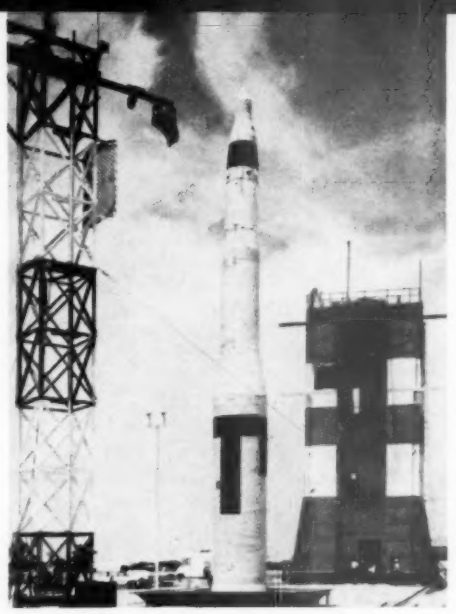
There was some conflict—probably more political than real—about the way this will be done. Gen. Schriever took pains to emphasize that the first military U.S. satellites, Samos for reconnaissance and Midas to detect hostile missile launchings, were "peaceful passive systems" which could not possibly harm anyone. He said that no systems were under development to deliver fire-power from space and that U.S. space policy was for peaceful purposes.

On the other hand, Maj.-Gen. O. J. Ritland, commander of the U.S.A.F. Ballistic Missile Division, suggested that enemy ICBMs might be attacked by interceptor satellites which could dispatch rockets to "destroy the aggressor missiles." And Maj.-Gen. David Wade, of Strategic Air Command, said that the boost-glide Dyna-Soar "could well be the basis for the first manned vehicle ever to perform an operational task in space."

Gen. Schriever himself also said that studies were being made for the interceptor satellite, but that there was "no active programme" for shooting down satellites. It is an open secret, though, that detailed studies are being made of missiles to do just this—and that reconnaissance satellites must be intercepted on their first pass.

So far as the Midas and Samos systems are concerned, they are regarded as vital to bridge the "Iron Curtain information gap" and the Samos programme is being accelerated, with the first polar-orbit launch from Point Arguello scheduled for early October. Not much concern has been expressed that Russia will regard these as sophisticated U-2s; it is pointed out that U.S. military satellities in the Discoverer series have already orbited over Russia.

On deterrent policy it is argued that there is a greater likelihood of general war now that Russia with its ICBMs has "a general war capability." Indeed, for this reason "brinkmanship" in limited wars may be carried further.



DEBUT.—This Minuteman shown at San Francisco makes the first public appearance of the type.

According to Gen. Thomas D. White, U.S.A.F. Chief of Staff, "effective deterrence includes the possession of military forces to deter war and should war occur, the military strength to prevail. . . . If deterrence fails and a nation must fight, it wants—and must have—the strength to win."

Notes on current and future U.S.A.F weapon programmes follows:—

Aircraft

B-52.—According to Boeing, orders for this aircraft up to the G version total 604 aircraft and an additional 102 B-52 Gs are on order. The first of these will fly later this year and all will be in service by 1963.

B-52s are being equipped with the Hound Dog ASM, which has a range of about 500 miles, and greatly increases their striking ability. The B-52 is the "dominant tool in the SAC arsenal." G and H models will get Skybolt ALBMs later.

B-70.—The development programme for this Mach-3 bomber has been restored. Work on its military systems will begin again. No production orders have been placed, but the U.S.A.F. considers that combat wings of this type are needed by 1966.

The aircraft is to deliver high-yield nuclear weapons against hardened and high-priority targets, probably going in to follow up a missile strike. There are no technical reasons why such an aircraft should not be in service by 1970.

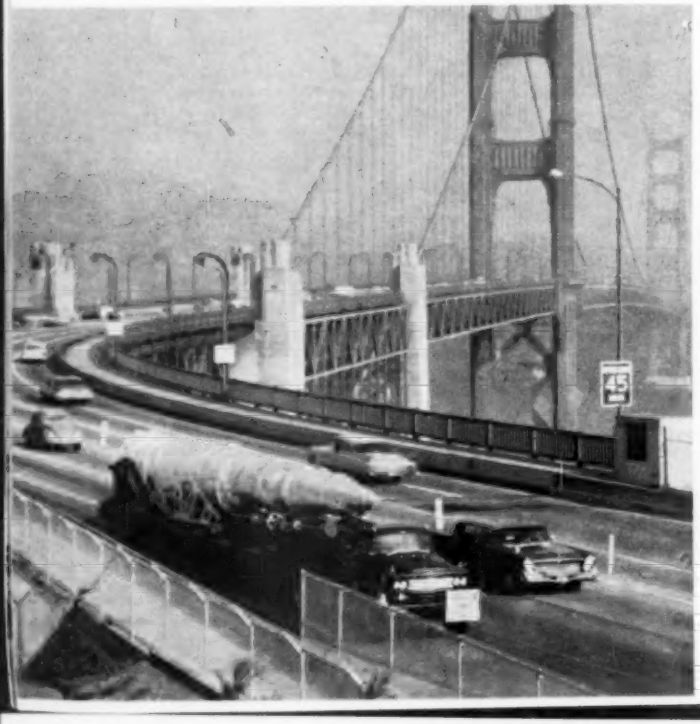
F-X.—This is an STOL fighter and strike aircraft which Tactical Air Command needs in service by 1965. Intended as the most flexible tactical aircraft yet, it is to be capable of operating at both high and low levels at as great a supersonic speed as current turbojet engines and an aluminium-alloy airframe will allow.

Able to operate from second- and third-class airfields, it will have characteristics to "allow it to survive in flight in a general war." At subsonic speed its range will allow it to make Atlantic crossings without flight refuelling. It will probably have a variable-sweep wing.

Some $25 to $30 million have been allocated for this aircraft in the 1961 budget. TAC hope that a decision on a manufacturer will be made within six months. One project in this category is the variable-sweep aircraft proposed by Boeing.

Long-endurance Aircraft.—Both chemical and nuclear-powered aircraft are under study as long-endurance strategic aircraft which "armed with ballistic missiles to roam the skies, will permit us to hide powerful and quick-reacting striking forces in the air itself." As one general remarked with tongue in cheek, this will be in effect "a kind of airborne Polaris."

A considerable future is expected for low-



MOBILE MINUTEMAN.—One-third of the solid-fuelled ICBMs are to be deployed moving at random on U.S. railroads. Here is the first on a trailer crossing San Francisco's famous bridge.

drag laminar-flow aircraft. Nuclear aircraft are farther off in time, but "are bound to come," according to Gen. Schriever.

Missiles

Atlas ICBM.—Three Atlas D/ICBMs are now on 24-hour alert at Vandenberg A.F.B., as are six more at Warren A.F.B., Cheyenne, in Wyoming. An additional three could be launched in an emergency from training pads at Vandenberg, but their reaction time would be longer.

Nominal reaction time of the alert missiles is 15 minutes. Because of their radio-inertial guidance, they are arranged in groups of three around a single ground guidance aerial array. As each is guided for about six minutes, the third missile can be launched at best only 27 minutes after the "go" signal.

Later Atlases with all-inertial guidance are not subject to this limitation. It is possible, however, to take the Atlas count-down to T-8 minutes and hold it there indefinitely.

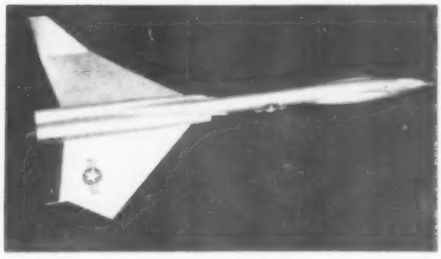
Locations have been announced for 13 Atlas squadrons; they will have 135 operational missiles in all. Four types of launch pad will be used.

The first, at Vandenberg, is similar to the R. and D. pads at Canaveral, in which the missile is kept erect at all times. In the second type, of which there are examples at Vandenberg, the missile is kept horizontal in a concrete shelter and is only erected before launch.

The third type is similar, but the shelter is buried so that its roof is at ground level. This semi-hardened type is designed to withstand a 25 p.s.i. blast.

In the fully hardened fourth type, the missile is stored vertically in an underground silo and only lifted just prior to launch. This installation is designed to withstand a 100 p.s.i. blast.

Atlas Es with all-inertial guidance will be installed in these silos: they will also be kept



M=3 INTERCEPTOR.—A Hughes Aircraft project with 1,000-miles radius of action and service ceiling of 100,000 ft.

with fuel aboard at all times; only the liquid-oxygen tank will need to be filled before launch.

By Sept. 19 there had been a total of 63 Atlas test firings. Forty-one were successful in meeting test objectives, nine were partial successes.

The early Atlas bases have been about six months behind schedule. Later bases should become operational on schedule.

Titan ICBM.—The position of the 10 Titan squadrons has been announced. The first silo-lift site at Vandenberg has been completed and the launch of an operational type missile from there will be made soon.

Later Titan 2s with all-inertial guidance will have storable propellents, thus greatly reducing their reaction time.

Minuteman ICBM.—The programme for this three-stage solid-propellent ICBM has been accelerated. The missile will come into service in mid-1962, one year ahead of the original schedule.

Approximately two-thirds of the Minuteman force will be mounted in hardened underground silos. The other third will be mounted on special trains "moving at random on the railroad network of the U.S." The mobile missile will enter service about six months after the fixed-base ones.

The first operational Minuteman ICBMs will be deployed in hardened sites near Malmstrom A.F.B., Montana. There will be three squadrons in this area, each with 55 missiles (50 operational, 5 spares).

Each launch position requires about two acres of land. Site construction is expected to take 12 to 18 months and to cost about $20 million for each squadron.

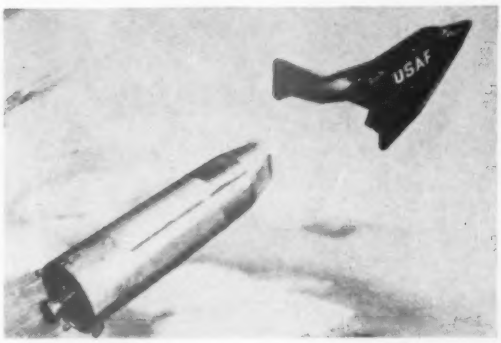
The Minuteman will give the U.S. a "push-button war capability." Each missile will be held at a continuous state of readiness in its silo, where it will remain for perhaps three years before removal for a major check.

The first full launch of Minuteman will be made from Cape Canaveral at the end of this year. Eight consecutive successful tests have been made with silo development missiles, completing a programme originally expected to require 18 test-vehicle launches.

Minuteman is much cheaper than Titan or Atlas, costing between one-fifth and one-quarter as much.

Skybolt.—Development of this ALBM is regarded as essential to maintain the effectiveness of the SAC B-52 force in the mid-sixties.

Advanced ICBMs.—Projects such as Mightyman and Minuteman were mentioned in questions after U.S.A.F. briefings, but no official information was given about them. According to Mr. Dudly C. Sharp, Secretary of the U.S.A.F., study is being devoted to missiles which might follow Minuteman.



BOOSTED SPACE-GLIDER.—An artist's impression of Dyna-Soar separating from the final stage of its launching booster.

Space Projects

Midas.—This infra-red warning satellite, which has already been test-launched, will increase the U.S. "national alert status" by extending the 15-minute BMEWS warning of a missile attack to about 25 to 30 minutes. It will detect the exhaust of missile engines immediately after launch and flash instant warning to control centres in the U.S.

Samos.—First launch of this world-wide surveillance satellite is to be in early October. Both satellite recovery and transmission of data from space will form part of this programme.

Transit.—This navigation satellite programme is designed to provide highly accurate position information for ships and aircraft.

Advent and Flag.—These two related communications satellite programmes are intended to feed eventually into a global communications system.

Dyna-Soar.—This boost-glide satellite is being developed at very high priority. To quote the Secretary of the U.S.A.F., "on drawing boards now are concepts for vehicles that can orbit, re-enter and operate in the atmosphere and return to an orbital plane at the will of the pilot. There is much research to be conducted before such concepts can become Air Force programmes, but efforts are definitely aimed in that direction."

Anti-ICBM Work.—The convention marked the first open attack by a U.S.A.F. general on the concept of the Nike Zeus AICBM missile; this is intended to intercept warheads during their re-entry phase. The U.S.A.F. considers the launching phase is the one at which there is the best chance of intercepting an ICBM; at this stage it is most vulnerable and it has not had time to distribute its decoys.

Individual Command Plans

S.A.C.—Speaking about Strategic Air Command, Gen. David Wade said that it had only a "gentleman's agreement" with the Royal Air Force. This did not involve any joint agreements on the targets to be attacked in the event of war. S.A.C. has been training to maintain an airborne alert.

The Command expects to have about equal numbers of ICBMs and bombers by about 1965.

Air Defence.—Gen. Laurence S. Kuter made a plan for the immediate development of a long-range interceptor such as the cancelled F-108: this would be needed to counter attacks by aircraft of B-70 type. Even current Norad interceptors and SAMs cannot cope with enemy aircraft carrying missiles of the Hound Dog type.

Reductions in F-101, F-102 and F-106 squadrons have been planned on the assumption that the F-108 would be developed. Despite cancellation of the last named, planned reductions of earlier types have been accelerated.

Another plan which has been cancelled covered the installation of a command and control system of solid-state computers known as hardened SAGE super combat centres. This has been cancelled. Soft SAGE, the current system, has no protection at all against blast. Also it cannot handle both civil and military air traffic.

NORAD feels that the Nike-Zeus system should be ordered as it is the only current anti-missile system, and should be supplemented as more advanced systems are developed.

Military Air Transport Service. An aircraft is needed to replace the C-124 Globemasters. It must have a low operating cost and the range to carry large loads on non-stop ocean crossings. $50 million has been allocated for its development, but this will not buy any aircraft. Almost 200 will be needed for a balanced airlift force.

A high-speed turbojet is required to fly emergency support for SAC and TAC. $200 million has been allotted for this and will satisfy part of the requirement with some modification of aircraft now available.

For the future, a big transport aircraft of phenomenal endurance is anticipated by combining low-drag B.L.C. with advanced propulsion.

Tactical Air Command. Some of its F-105s will be deployed both in Europe and Britain, but no date could be given. There is a strong requirement for a TBM—tactical ballistic missile—to supplement its manned aircraft in the NATO area.

Conclusion

Inevitably, the AFA convention is largely a platform for the U.S.A.F. to spread the gospel about its aims and to outline its many, and expensive, future needs. Nevertheless, Gen. Schriever's claim that the U.S. has caught up with Russia in ballistic-missile development seems well-founded.

The future aims of the U.S.A.F. are perhaps grandiose, but people who have not been to the U.S. cannot appreciate the increased sense of urgency felt in the U.S.A.F. about competing with, and keeping ahead of, Russia in the weapons field. The driving force of the U.S.A.F. is impressive, and so are its achievements.

J. R. COWNIE.

Air Transport

And now Skycoach

FIVE British and Commonwealth operators will be offering, from the beginning of next month, a new class of service available only to British nationals resident within the territories to be served. To be known as Skycoach, these new services will offer fares from 20% to 30% below the current IATA-agreed rates for economy-class travel on the same routes. Skycoach is exclusively a British cabotage service, sanctioned by the Minister of Aviation and agreed by the governments of the other territories concerned; it neither requires nor has the approval of the IATA Traffic Conferences.

Following discussions between the Ministry, the five operators concerned—B.O.A.C., C.A.A., E.A.A., British United and Cunard Eagle—and other interested parties, a common standard of service has been agreed. Single cold meal trays will be offered on the aircraft, at 7s. 6d. each, with free refreshments limited to hot and cold beverages. There will be no bar service and meals at scheduled ground stops will be paid for. No reading matter, route maps, or flight stationery will be carried.

A seat pitch of 32 in. has been adopted for Skycoach, compared with the 34 in. enjoyed on most economy or tourist-class flights. The free baggage allowance is to be 33 lb. (15 kg.).

B.O.A.C. and Cunard Eagle will be using Britannias, and other operators, Viscounts. Seating capacities are 62 in the Viscount 810 (East and Central African routes); 92 in the Britannia 102 (East and Central Africa, the Far East and Aden); and 128 in the Britannia 310 (Atlantic routes). Details of starting dates and frequencies are given in the summary which follows.

East Africa. First service Oct. 4 by E.A.A., followed by British United on Oct. 18, then E.A.A. again, then B.O.A.C., and so on at fortnightly intervals. Serves Entebbe and Nairobi.

Central Africa. First service by C.A.A. on Oct. 10, followed by B.O.A.C. on Oct. 24, then C.A.A. again, then British United, and so on at fortnightly intervals. Serves Ndola, Lusaka and Salisbury.

Bermuda and Bahamas. First service by Cunard Eagle on Oct. 10; thereafter at monthly intervals alternately by B.O.A.C. and Cunard Eagle. Serves Bermuda and Nassau.

Caribbean. By B.O.A.C. only, to Kingston and Montego Bay on Oct. 15 and to Barbados and Trinidad on Oct. 22, and once a month thereafter on each of these routes.

Far East. By B.O.A.C. only, to Singapore and Hong Kong once a month starting on Oct. 17.

Aden. By B.O.A.C. only. Still being planned, but probably only four services a year.

Licence Fees

DETAILS were given by the Ministry of Aviation last week-end of the charges which it is proposed should be made for air service licences under the Civil Aviation (Licensing) Act. These proposed fees will be incorporated in the Civil Aviation (Licensing) Regulations, now in draft form (see our issue for Jly. 29), and expected to come into force early next year.

Fees will be payable in two parts, and are in general designed to cover the costs of the Air Transport Licensing Board. The first part of the fee will be payable when application is made for the grant or variation of a licence; the sum in this case varies from £2 to £200 depending on the class of licence and the regional area and length of the route. This fee is not refundable unless the application is rejected (under Section 2 Subsection 3 of the Act) on the grounds that it involves negotiations with a foreign government which the Minister considers to be "inexpedient."

Upon a licence or variation being granted, a further fee is payable, and a like sum becomes due annually until the licence expires. This fee ranges from £10 to £500. In the case of transitional licences which are to be granted for existing services, the first annual fee will be payable on Mar. 30, 1961.

Most expensive of the new licences will be those for normal scheduled service in Class A. This class is subdivided into six groups, of which one is for U.K. domestic, three more are for routes with one terminal in the U.K., according to distance, and the other two are for routes wholly outside the U.K., of up to and over 1,500 miles in length respectively. For U.K. domestic routes, the application fee is £25 and the annual fee £40; at the other extreme, routes from the U.K. to terminals beyond Europe and the Mediterranean coast, and those of more than 1,500 miles with no U.K. points of call will cost £200 for an application and £500 annually.

The fees for a charter service (other than an inclusive tour) under a Class B or Class E licence will be £20 on application and £60 on grant and annually. For a Class C licence, covering a series of not more than three charter flights between specified points, there will be an application fee of £2 but no grant or annual fee. Any other licence will cost £10 on application and £10 annually on being granted.

Insurance for the Turbojets

THIS week, Sept. 28-30, the International Union of Aviation Insurers has been holding its annual conference in Sicily, with delegates from 19 countries including, for the first time, Brazil, India and Japan.

Among the speakers were Mr. Alan Hunter, principal surveyor of the British Aviation Insurance Co., who dealt with turbojet airliner experience and prospects, and Mr. R. E. Hardingham, C.M.G., O.B.E., chief executive of the A.R.B. The problems of supersonic flight were also examined and the report of the technical and statistical sub-committee on this subject incorporated a paper by M. M. Hurel.

The London aviation insurance market was expected to report fairly good results in their experience with turbojet operations so far, though training-flight losses are "still causing concern." The premium income of the market has risen by about 25% during 1958 and 1959—largely because of the rates appropriate to the high values of the new turbojet fleets.

The methods used for the removal of large aircraft from runways after accidents have not been satisfactory to London underwriters and IATA is to be approached in this matter. Presumably aircraft have been further damaged during emergency removals—with consequent additional costs for the insurance market.

Convair 880 and 600 Production

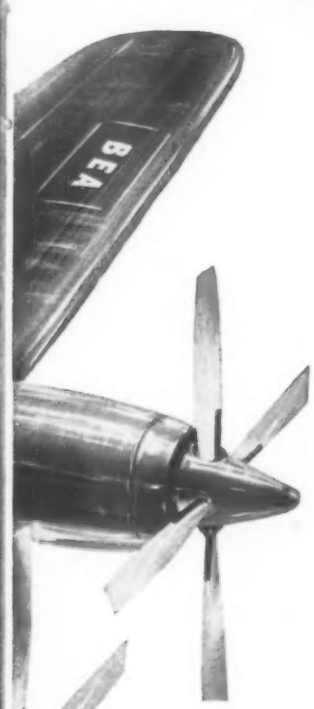
A REPRESENTATIVE of THE AEROPLANE AND ASTRONAUTICS who visited San Diego last week writes that 20 Convair 880 jet airliners have now flown and the type is in service with Delta Airlines, which has received six of the 13 aircraft it has on order. Aircraft have been ready for delivery to T.W.A. since May, and are accumulating on the airfield at San Diego. Ten are now parked there, covered in a green protective coating to shield them from corrosion by the salty atmosphere.

A down payment of $25 million has been made by T.W.A., but aircraft cannot be delivered until completion payments are made. Delivery of the Delta aircraft cannot be accelerated

(*Continued on page 469*)

FRENCH FEEDER.—Having completed more than 50 hr. flying on its initial tests, the Max Holste MH260 Super Broussard has now gone to the Flight Test Centre at Brétigny. This picture is the first to show the wheel fairings in position.

The longest queues are for the cheapest seats



People want to travel. They want to travel quickly. They want to travel cheaply.

Economy fares offered by airline operators have turned these requirements into record traffic figures. During 1959, 72% of all North Atlantic passengers flew 'Economy Class' and on U.S. domestic trunk lines Coach Class travel held a record share (43.6%) of the market. In Australia cheap fare travel has increased by 102%.

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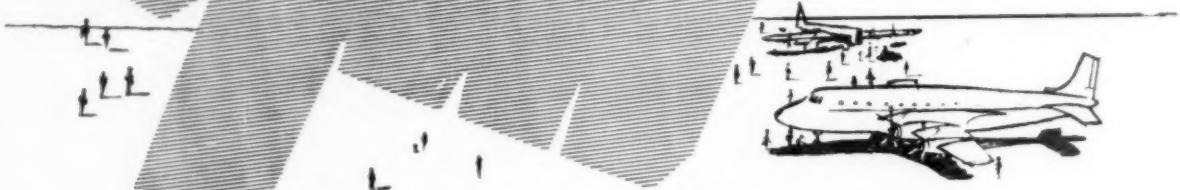

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Air Transport . . . .

NEW EXECUTIVE.—Built in competition with the Lockheed C-140 JetStar, which has now been ordered by the U.S.A.F., the McDonnell 119 has been re-styled as the McDonnell 220 as an executive aircraft, and now has a 10-seat interior layout. General Electric CJ-700 turbofans are suggested in place of the Westinghouse J-34s which power this prototype.

(*Continued from page 468*)

because they are spaced on the production line between aircraft for T.W.A.

Two Convair 600s are now in the final stages of assembly in the open at the Convair plant; other aircraft of this type are close behind. The first 600 is scheduled to make its maiden flight early in December. Four more will follow at monthly intervals; these five will be used for the certification programme. Production will then build up to three to four per month.

To date a total of 93 Convair 880s and 600s have been ordered; these will be in production until mid-1962. At present the 41st aircraft is near the beginning of the production line.

B.E.A.'s Potential Dividend

SECOND thoughts, followed by a few inquiries and some simple arithmetic, suggest that the guess at B.E.A.'s potential dividend (see our issue of Sept. 2, p. 272) was very much on the pessimistic side. A figure of 3% was hazarded as the dividend which might have been paid to stockholders for 1959-60 had the Corporation been a normally financed business.

The revised sums (e. and o.e.) go something like this:

The mean capital for the year which might have been the subject of dividend payments totalled about £43 million. The profit, before payment of interest to the Government, was £3,239,084—or 7.5% of the mean capital. Assuming that the normally financed airline would have put a similar sum (£2,035,325) into various reserve funds, then the profit available for distribution would have been 2.8%.

But it is most unlikely that this mythical B.E.A., Ltd., would have been pioneering the development of new aircraft types, or, therefore, that it would have needed to put £1 million into a development reserve. So the minimum dividend would have been a little over 5%.

As second thoughts become third thoughts it begins to be obvious that the calculations cannot be done as simply as this. The Corporation's capital liabilities include provision for, amongst many other things, aircraft which will not be delivered for several years. This fact explains an otherwise mysterious sentence in the introduction to the *Report and Accounts* in which the total profit is described as "representing a return of 12% on capital and reserves actively employed in B.E.A. operations during this year."

The "actively employed" capital and reserves are therefore being assessed at £27 million and some £16 million of the mean capital of £43 million must be assumed to be invested in such things as aircraft and buildings under construction. If £27 million is taken as the working capital, then it might be said that B.E.A., Ltd., could have paid a dividend of more than 8%. But that, perhaps, is stretching might-have-beens a little too far.

Learning from Experience

THE prospectively disastrous results of an effectively unreported deterioration in landing visibility were pinpointed in the report on the accident to B.E.A.'s Viscount 802, G-AOHU, at London Airport on the evening of Jan. 7, 1960. The findings of the M.o.A. Accident Investigation Branch came, in fact, as something of a surprise to those who were not directly concerned with the event. The report also criticized the airport's fire-service fog-navigation arrangements.

In the words of the report the accident was caused "by the failure of air traffic control to notify the captain of a critical deterioration in runway visual range during his final approach. In consequence he attempted to land in a visibility which gave him insufficient visual reference, with the result that the nosewheels contacted the runway before the mainwheels, thereby overstressing the nosewheel unit and fracturing its attachments." The Viscount travelled for 500 yds. along runway 28L with its nose rubbing and a local fire broke out. All the occupants were evacuated unhurt though the fuselage nearly burned out.

Two minutes before the incident, which occurred at 19.22½ hrs. G.M.T., the runway visibility dropped from 400 yds. to 250 yds. The Viscount, flying from Dublin, was then on its approach, but the information was not, because of unexplained human failure, passed on to the captain. Had he been informed, the approach would have been discontinued, since 250 yds. was 150 yds. below B.E.A.'s night landing minimum for Viscounts at L.A.P. In fact, at the moment when the aircraft was crossing the threshold, slant visibility had, according to the runway controller's log, dropped to 100 yds. and, half a minute later, was even less than this.

The Viscount had been fuelled at Dublin so that it could return to Collinstown and the alternates were Hurn or Jersey. L.A.P.'s visibility had been poor all day and the captain had kept himself informed of conditions from 18.29 hrs. onwards when the descent was about to be started over Bristol. A monitored approach was made, with the first officer controlling the aircraft during the descent and approach. The captain took over at the first bar of the approach lighting.

The report also shows, once again, the value of tape recordings. The time signal for 19.22 hrs. was injected into the recording during the final sentences which were spoken by London Precision (GCA) thus: ". . . three-quarters of a mile from touchdown. Left left further five degrees. On the centre-line. Twenty feet below the glide path. [Time signal.] On the centre-line. Half a mile from touchdown. Approach completed. Out." At 19.22½ hrs. the aircraft had come to rest.

As is often the case with shallow fog, the visibility appeared from the air to be very much better than it was and the captain stated in his evidence that he could see the first bar of the approach lights when about three-quarters of a mile from it and could see the threshold and some contact lights when passing over this first bar. Even while he crossed the threshold he was confident that visibility was better than the B.E.A. minimum of 400 yds. Both he and the first officer thought that a normal flare-out had been made, but that the touchdown was rather heavy. Immediately afterwards they had the impression of running into a wall of fog.

The first marks on the runway which could be attributed to the Viscount were those of the four propellers. The fire was apparently initiated by frictional heat (550-600° C.) which ignited spraying hydraulic oil from the fractured main steering-jack supply pipe. Runway marks and other evidence suggested that the landing had been made with little or no flare-out.

Because of the fog the rescue tender, with the Station Fire Officer and driver, got lost, but the ambulance driver reached the aircraft and guided two of the fire appliances to the crash by means of his bell. The first fire-service vehicle reached the aircraft about nine minutes after it had come to rest. Four appliances ran out of water, though the nearest hydrant was only 300 yd. away. The report considers that guidance from the Airfield Surface Movements Indicator (radar) should have been requested, though the vehicle-tower communication methods have not previously been satisfactory.

Since the accident the Ministry has arranged for direct R/T links between vehicles and the tower (where the ASMI display is installed); for direct telephone links between Runway Visual Range observers and the approach controller; for R.V.R. indicators at GCA talk-down stations; and for leader markings from the runway edges to the fire hydrant positions.

KENT TERMINAL.—This new passenger terminal has been built at Manston to serve Silver City passengers on the vehicle ferry route to Ostend and the Silver Arrow rail-air route to Paris.

Central American Co-operation?

SINCE going to press with our comments in last week's issue (p.441, "Protectionism in Central America") there is news of developments which may lead to some co-ordination of international services in the Central American and Caribbean areas.

It has now been proposed by various aviation officials, our correspondent writes, that one airline should represent all the Central American Republics in international operations rather than that there should be five separate flag lines operating internationally—and practically all at a loss. Such a proposed airline would be formed under the new Central American Economic Integration Treaties which will provide for a common market among the Central American Republics.

Several authoritative sources have suggested that the El Salvador flag line, TACA International, would be the logical carrier to handle such an assignment, since it has adequate experience in the international field and operates suitable aircraft, including Viscounts, for inter-country operations in the Central American area.

Meanwhile, it has been reported that the German airline, Lufthansa, is interested in acquiring an interest in one or more of the Central American airlines and has already made a proposal to Guatemala in connection with its government-owned airline, Aviateca. Officials of this airline, our correspondent adds, would neither confirm nor deny that such a proposal has been made. It is noted, however, that Lufthansa has recently opened a modern office and sales organization in Guatemala City, although it does not yet operate into Central America.

The present Guatemala City airport, Arora, is now being extended and it is expected that civil turbojet aircraft will be able to operate into Guatemala by Jan. 1, 1961.

Supersonic Common Sense

SPEAKING for himself rather than, perhaps, for IATA, Dr. Henry J. Gorecki, the Association's financial director, made some pointful comments last week about supersonic transports and the airlines. He was addressing the Centro per lo Sviluppo dei Trasporti Aerei in Rome on Sept. 23.

After saying that careful planning would be essential "to avoid the economic chaos which would result in the aviation industry with the premature introduction of the commercial supersonic aircraft," he added that "progress in air transport is important, but progress just for its own sake, or progress that is too rapid, can be senseless.

"It is in the positive interests of the air transport industry," he continued, "to ensure that these aircraft are not introduced too early and to co-operate with manufacturers at the proper time to see that the transport industry gets the type of aircraft it will need.

"The present generation of jet aircraft must be assimilated first. This is not only important to the economic health of the industry; it is also in the interests of cheaper and better air transport for the public.

"There is a definite financial limit beyond which airlines capable of operating such aircraft cannot go. If governments are the main supporters of such aircraft, apart from the manufacturers, and believe them to be in the public interest, then it is reasonable to expect them [the governments] to participate in defraying development costs."

Referring to the subsonic turbojets and to the "tremendous capacity" which will become available in the next few years, he said that "the jet can potentially provide lower-cost services to the public, but these can only be offered if load factors are adequate and the traffic is available."

The Air-freight Business

THE kind of effort which some of the U.S. passenger carriers are now putting into the air-freight business is demonstrated by Eastern Air Lines' "Cargo Pursuit Sales Force." Last month this vigorously named group of 17 representatives visited Puerto Rico—a primary overseas terminal for Eastern—to stir things up and to obtain traffic for the carrier's new all-freight services between San Juan, Miami and New York.

This task force, with representatives of Puerto Rico's largest trucking company, is said to have called on 3,000 actual or potential users of the service during a seven-day tour—averaging 25 visits per man per day. It was the first time that Eastern had undertaken one of its "saturation campaigns" in the specific search for new air-cargo customers, and is another reminder of the fact that the development of air freight does not consist merely in providing economic all-freight aircraft and some ingenious terminal handling facilities.

Eastern's five converted L-1049Cs have, in addition to the usual hydraulically operated loading doors and reinforced floors, special electric windlasses and capstans, roller-tracks and tie-down rings for cargo handling. The five aircraft have, between them, a theoretical annual capacity of about 53 million ton-miles. In 1959, without any all-freight aircraft, Eastern performed some 35,500,000 revenue freight and mail ton-miles—about 8% of its total ton-mileage for all revenue traffic.

With the coming introduction of CL-44D-4s with U.S. all-cargo operators—and, in particular, so far as domestic schedules are concerned, with Flying Tiger—the C.A.B. is looking again at the existing minimum rates policy. The general impression is that the present "floor" must inevitably come down and it remains to be seen whether the mixed carriers, now using converted piston-engined passenger aircraft, will fight for a retention of present domestic rates. The airlines and other interested parties have until Oct. 14 to file their suggestions with the Board and, according to New York reports, Flying Tiger will certainly propose many rates which are below the existing minimum level so that the CL-44s can be more effectively used.

Lufthansa's converted L-1649As are now in service and have been flying return all-cargo services between Frankfurt and New York five times weekly since the beginning of last month. Air India has taken delivery of its first all-freight L-1049 for operations between Bombay and Europe and conversion work is now proceeding on a second Super Constellation.

Equipment in an Eastern Air Lines L-1049C shown here includes the hydraulic freight door, roller-tracks and portable electric windlass and capstan.

Aviation Medical Research

EARLIER this month the R.A.F. Institute of Aviation Medicine organized a very comprehensive programme to demonstrate its work to the delegates attending the Fifth European Congress of Aviation Medicine in London (THE AEROPLANE AND ASTRONAUTICS, Sept. 9). Last week this same demonstration was opened to the Press and the commanding officer, Air Cdre. W. K. Stewart, explained the problems and tasks undertaken by the Institute, and its work with other outside establishments.

Now housed in modern laboratories, with a staff of approximately 30 medical officers and scientists, the Institute is the major aviation medical research establishment in this country. A great deal of its research is looking well ahead and one of the main problems being studied concerns the changes in the environment of flying which may impair aircrew safety and chances of survival in an emergency. The Institute is not doing anything directly connected with any space programme, but its doctors have found that space as such starts at an altitude of about 52,000 ft., and that many of the problems associated with advanced high-performance aircraft are similar to those of space capsules.

Covering some 70 exhibits or demonstrations in 11 different sections dealing with applied physiology, neurobiology, instrumentation and recording, acceleration and escape, high-altitude respiration, biophysics, psychology, climate, and biochemistry, the displays were designed to show what is at present going on at I.A.M. and what has been done in the immediate past. It is impossible to describe all these diverse subjects in a single article and the following notes are intended to provide a general description of certain sections of the show.

Heating and Cooling

To study the requirements for heating and cooling the body in flight and on the ground the climatic section is equipped with a series of conditioned rooms. Its work covers such problems as the solution of heat-exchange equations; the design of ventilated clothing; and the development of warm and heated clothing.

For example, since the introduction of the standard ventilated suit for providing warm dry air to aircrew operating in hot climates, work has been undertaken on the similar provision of cold air for extra cooling. With the same standard suit this caused too much cooling of the main trunk, while the extremities—head, feet and hands—remained hot.

To overcome this problem and establish data for the design of a new ventilated suit providing more air to the extremities of the body and less, or none, to the trunk, I.A.M. undertook detailed body temperature measurement. For this a knitted suit of resistance wire was employed to give continuous readings of skin temperature on a recorder.

Head cooling is another problem which has been tackled and the Institute has developed a ventilated skull cap which will go into service when partial pressure helmets are used in hot climates.

For the other end of the temperature scale electrically heated underwear has been designed. Constructed from machine-knitted three-ply terylene yarn and 60/0016 silver-plated copper wire for the body areas, or similar tinselled wire for the extremities, it has a total heat output at 28V DC of 254 watts.

High-altitude Civil Flying

Emergency oxygen supply and the effect of a sudden lack of oxygen at high altitude form important subjects for study at the Institute of Aviation Medicine. Conclusions from preliminary studies undertaken to date indicate that supplying oxygen immediately after rapid decompression from an altitude of 8,000 ft. to 38,000 ft. does not prevent subsequent anoxia to aircrew who have been breathing air. This amount of anoxia is also found to be sufficient to cause significant impairment of pilot performance.

Underwater Escape

One of the major research problems undertaken at the Institute and at the Admiralty Hydro-Ballistic Research Establishment at Glen Fruin is that associated with escape from submerged aircraft. One particular aircraft type that has been investigated is the D.H. Sea Vixen which has been shown to have canopy jettison problems when submerged. This is brought about by the slow rate of flooding of the double pilot-navigator cockpit compared with the aircraft's sink rate. A high differential pressure builds up between the inside of the cockpit and the surrounding water which is not reduced enough to release the two canopies before the aircraft has sunk to a considerable depth.

To overcome this problem the observers' window is to be hinged so that it opens inwards at a differential pressure of approximately 1¼ p.s.i. to make for faster flooding in the case of ditching and therefore quick jettison of the two canopies. Compressed-air systems for underwater ejections are also being developed.

High Speed Ejection

Another study has been that of the physiological effects of exposure to ram pressure such as experienced during ejection at high airspeeds. Tests have been made under water with a subject strapped first to the prow of a launch and later to a test rig fitted to the rotating beam channel at the Admiralty experimental establishment at Teddington.

Altogether, 58 live runs up to water speeds of 20 knots—simulating 515 knots in air—have been completed. Measurements are made of the pressures inside the chest, the effects on the heart and other organs, and the loads on the legs and arms at various simulated airspeeds.

Visual Illusions at Night

The effects of moving targets on a pilot's vision in an aircraft at night have been studied with the aid of a simulator consisting of a rotating drum with lights fitted around the inside of its circumference. The subject is seated with his head within the drum and wears a contact lens which holds an electric lamp in front of the eyes.

With this equipment the position of the lamp, and hence of the eyes, may be determined during the rotation of the lights by measurement of the shadow of a knife-edge cast on the sensitive surface of a photo-electric cell. The results obtained, including the subject imagining the wrong movement and speed of the lamps, can be used to find out how the eyes perform under night flying conditions.

The Effects of Weightlessness

One of the I.A.M. studies associated with the problems of prolonged weightlessness and of motion sickness is an investigation of the effect of linear and angular acceleration on the precision of hand-eye co-ordination.

When the eye cannot see the hand reaching for a target, it is possible to demonstrate the accuracy with which a subject has learnt to co-ordinate hand and eye movements with visually estimated direction and distance to a target. When the experiment is done under water, simulating weightlessness, the subject points unknowingly too high. In true weightlessness, produced by parabolic flight, however, subjects have been found to point too low.

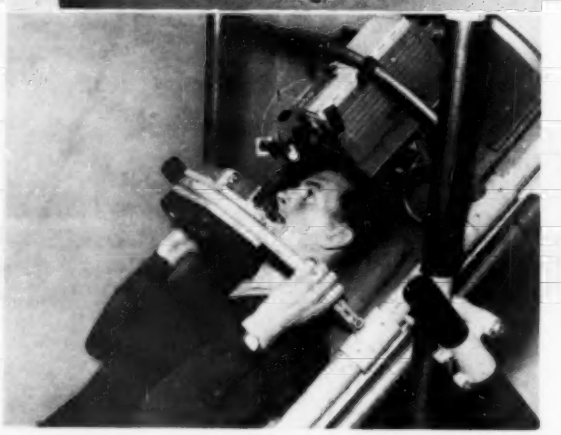
Survival Equipment and Clothing

A display of survival equipment for land and sea use included a new multi-seat dinghy developed by I.A.M. in conjunction with the R.F.D. Co., for the Vickers VC 10. This dinghy contains boarding platforms on both sides, double inflation floors and a double canopy.

Another exhibit was an experimental single-seat automatic dinghy for military aircraft. Designed to protect unconscious aircrew after ejection and parachute landing in the sea, it is intended to have completely automatic inflation, the wearer being carried clear of the water inside the raft without any physical effort. A high-pressure tube surrounds the dinghy and opens it out. The craft has a double canopy and floor. P.R.

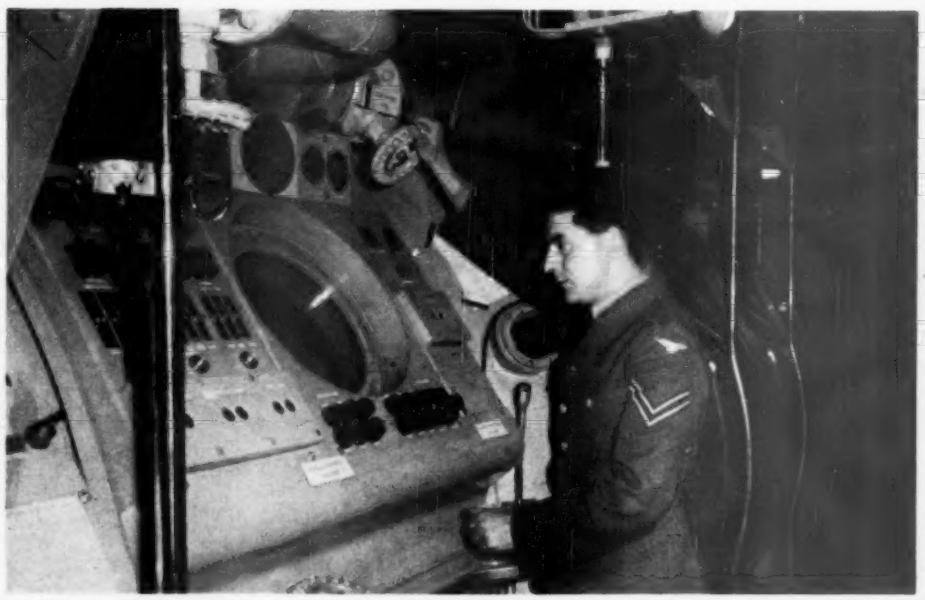
A subject preparing to undergo hand and eye co-ordination tests under water, in which the condition of weightlessness is simulated.

Photograph copyright "The Aeroplane and Astronautics"

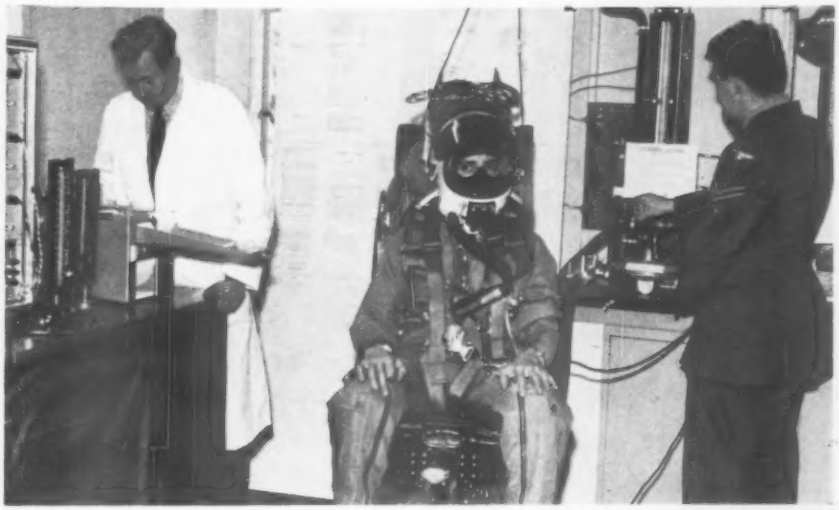


Above, a subject undergoing disorientation studies in a darkened sound-proof room (top) and the medical officer's position for controlling the three dimensional (pitch, bank and rotation) movement of the simulator.

Above, a subject strapped on to a rotating chair with two degrees of movement for the study of eye movements and optogyral illusions. The chair is equipped with a closed-circuit television camera system for providing a close-up picture of the eye.



Right, the control panel of the large and small decompression chambers contained in a standard R.A.F. mobile decompression trailer. A new chamber is under construction at the Institute.



Left, one of the tasks of the Institute of Aviation Medicine is the training of test pilots in the use of partial pressure jerkins and other items of high-altitude flying clothing.

Below, a wire suit designed to provide continuous readings of skin temperatures on a recorder; it consists of approximately 1,000 yds. of insulated resistance wire. Bottom, Dr. G. Byford demonstrating equipment for assessing the effects of moving targets on a pilot in an aircraft at night.

Doctors and Guinea-pigs at the I.A.M.

Below, the very rapid decompression capsule. It is fitted within a small standard decompression chamber.

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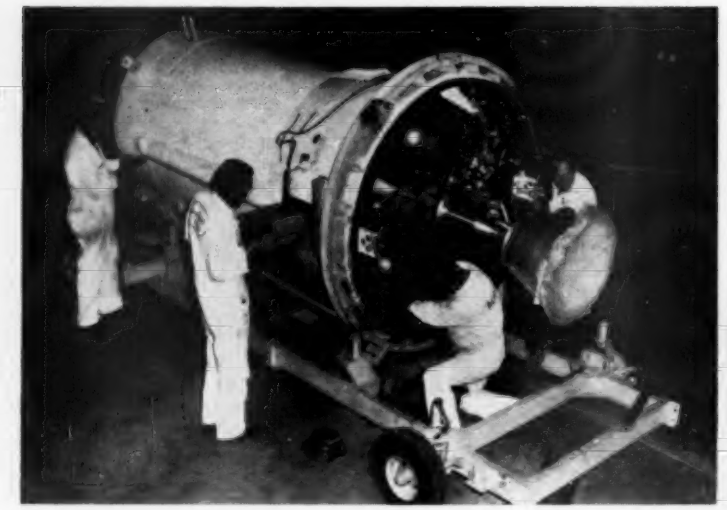
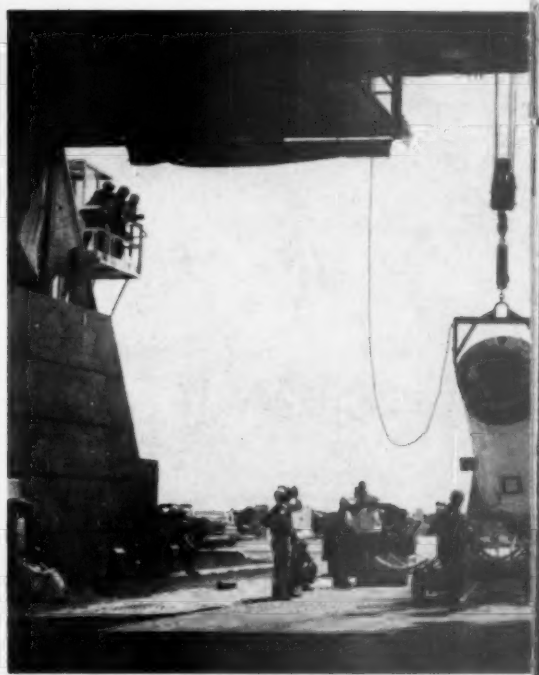
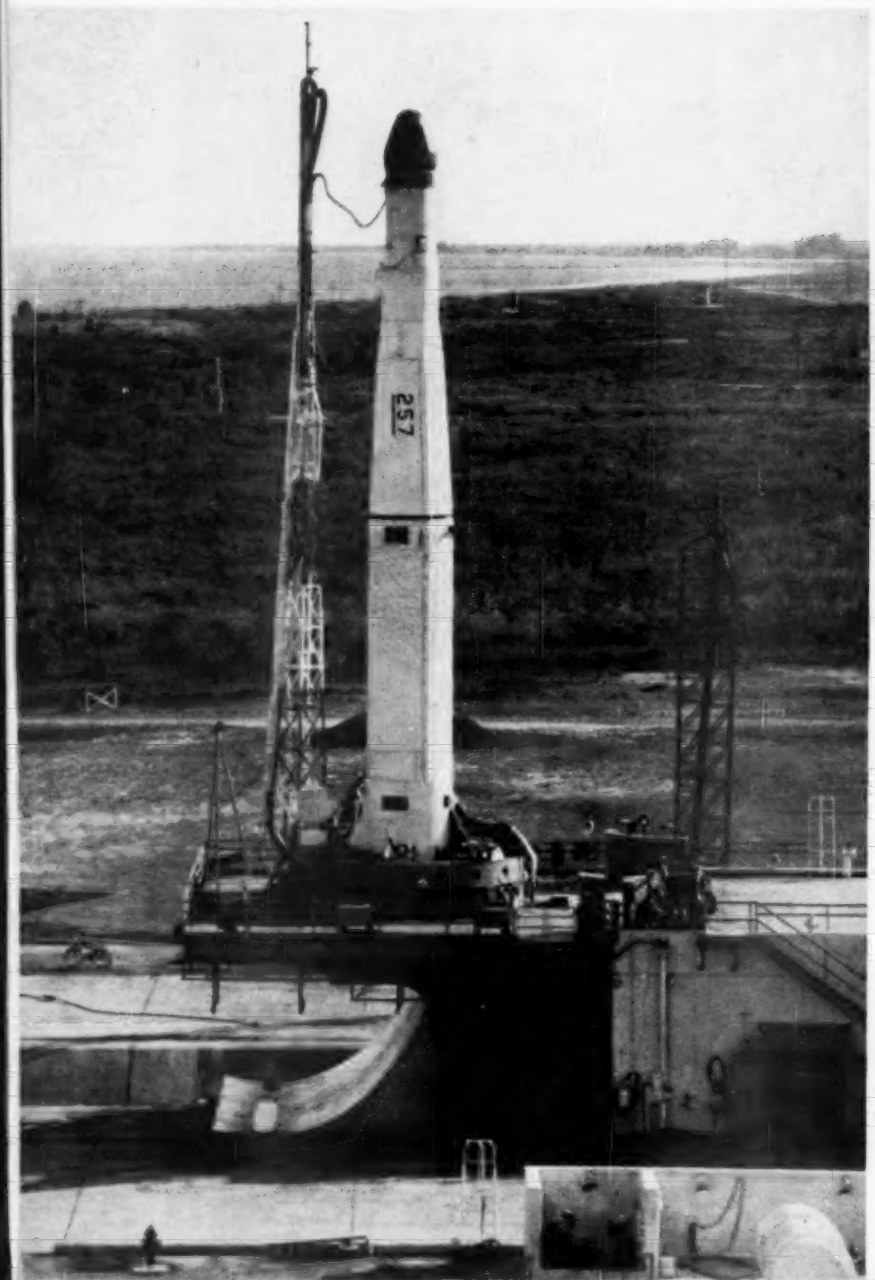




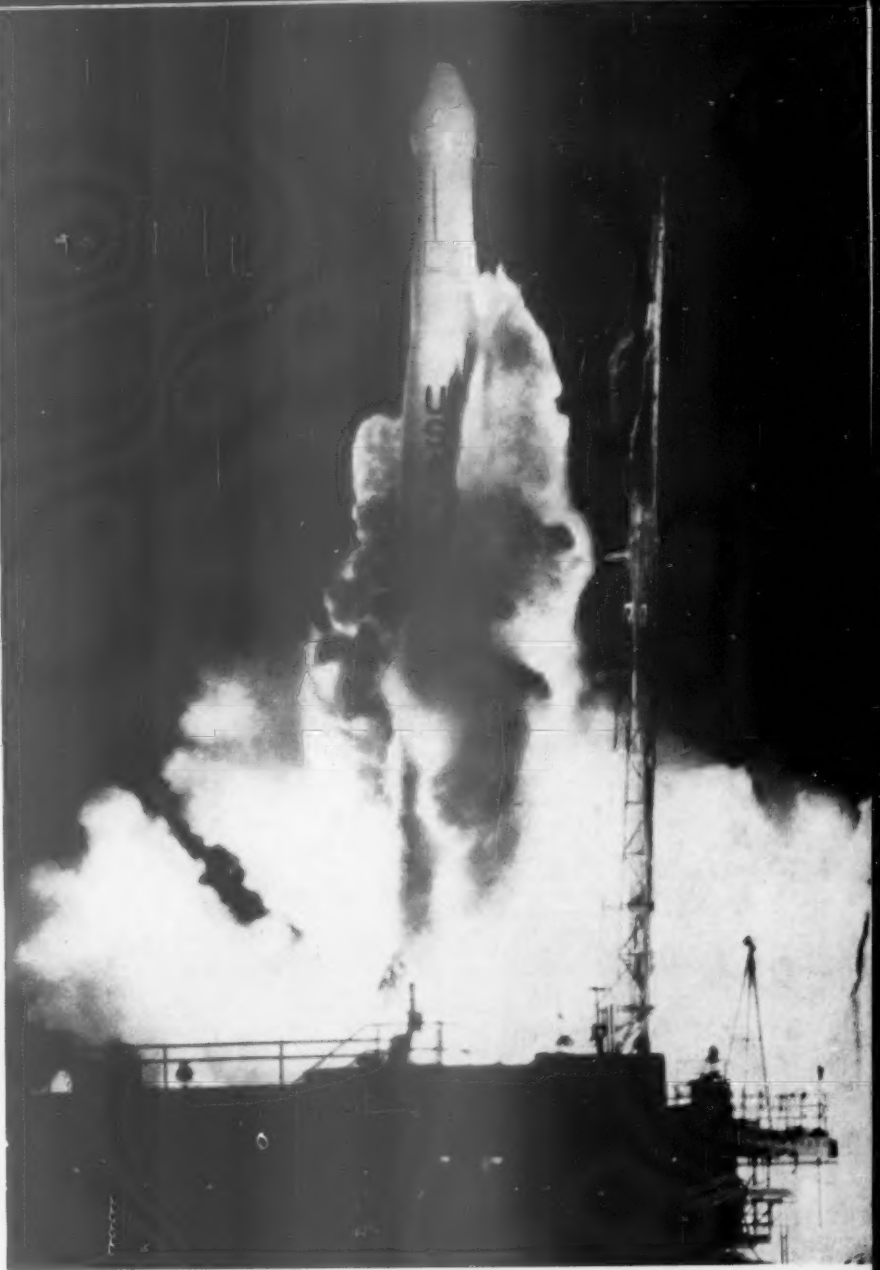


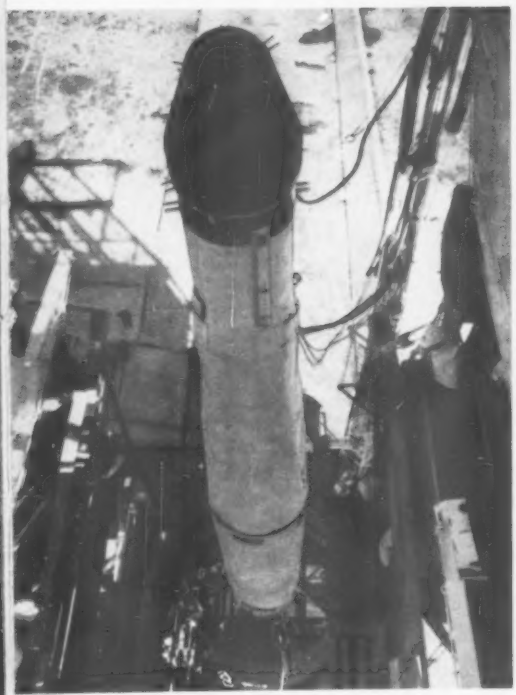
Top left, an Able Star unit is unpacked at Cape Canaveral prior to a pre-launch check in the hangar. Above, the restartable second stage being hoisted up the gantry stand for attachment to the Thor first-stage, in the background. Left, the completed Thor Able Star ready for launching.

Right, another view of the Able Star second-stage mounted atop the Thor first-stage. Extreme right, a close-up of a complete Able Star second-stage rocket assembly ready for despatch to Cape Canaveral.

pace

ocket system used for launching the Transit satellite into orbit and scheduled for the first unications satellite. Thor Able Star has a capable of being stopped and restarted in eve precise near-circular orbits. Further r page.





Aerojet-General's Able Star

ONE of the most significant rocket systems in current use in the United States space-programme is the Thor Able Star. This two-stage rocket has already been responsible for launching the Transit IB navigational satellite and soon is expected to put the first of the Courier "active" communications satellites into orbit. Its great advantage over previous rocket vehicles is that it has a top stage (Able Star) which can be stopped and re-started in space to achieve precise, near-circular, orbits.

Developed by Aerojet-General Corporation, the Able Star rocket system is a descendant of the company's successful Able unit which was originally the second stage of Vanguard, America's first satellite-launcher. The Able and Able Star were designed and developed by Aerojet's Systems Division under contract to the U.S.A.F.'s Ballistic Missile Division. Both are manufactured at the company's Azusa factory in California and are launched in combination with a Douglas Thor as the first stage. Systems manager for these launchings is Space Technology Laboratories, who developed the Able Star guidance system.

Able rocket development dates from 1957-58 when the United States urgently needed vehicles to perform nose-cone re-entry experiments. Although ICBMs were then undergoing tests, they were too expensive to be used in obtaining such data, with the result that Aerojet-General were called upon by the Air Force to produce a simplified rocket that could be rapidly produced.

Within a few months, Able was developed as a variant of the Vanguard second stage and mated to a Thor IRBM stripped of its military payload. It employs a solid-propellent third stage also developed for the Vanguard vehicle.

Thor Able was used to test nose-cones under realistic re-entry conditions and became the first United States rocket to travel the full intercontinental distance of 5,000 miles. It has also been used to launch various satellites and deep space probes, and has since been developed as the Delta space-booster. (THE AEROPLANE AND ASTRONAUTICS, Sept. 23.)

First "Re-start" in Space

Able Star was developed to meet requirements for a more advanced space-booster as a logical extension of the Able series. Work on it began in April, 1959, under the direction of Mr. Wayne D. Stinnet. Just one year later, Able Star was launched with an active payload—the navigational satellite Transit IB—and became the first United States rocket system to be re-started in space.

The successful launching occurred on Apr. 13 this year. Another successful firing took place on Jne. 22 when a double payload was established in orbit in the shape of Transit IIA and the NRL satellite. An attempt to launch a Courier satellite was frustrated on Aug. 18 when the Thor component of the launching vehicle failed.

Able Star has about 2½ times the total impulse of the Able system by virtue of its larger propellent tanks and thus offers significant increases in payload and range. Its rocket engine delivers a static thrust of 7,890 lb.

Throughout its development, the objective has been to achieve maximum performance by means of limited redesign, overall simplification, and optimum use of flight-tested components. The basic AJ 10-104 unit consists of a regeneratively cooled thrust chamber and propellent feed system, a gimbal actuator, tank pressurization, pressure vent, and roll stabilization system; interconnecting plumbing, and the necessary airframe structure.

The thrust-chamber assembly operates at a chamber pressure of 206 p.s.i. The system is designed to deliver a total impulse of 2,300,000 lb./sec. The propellents, inhibited red fuming nitric acid and unsymmetrical dimethylhydrazine, are fed to the chamber at a total flow rate of 28 lb./sec. and a nominal static oxidizer-to-fuel mixture ratio of 2.8. The nominal instantaneous specific impulse is rated at 278 lb. sec./lb.

Design of the Able Star propulsion system is directed toward the achievement of certain missions having long-coasting-time requirements which demand precise and sustained attitude control and the capability of rocket system re-starting. As a part of the re-start system, a coast attitude-control system is available as an optional feature. This system contains a pair of longitudinal acceleration jets for propellent-tank settling, in addition to the pitch, yaw, and roll attitude-control jets required to maintain direction stability.

The Able Star tank assembly is designed for a specific propellent capacity at a diameter compatible with existing booster vehicles. A high strength-to-weight ratio is obtained by the use of heat-treated AISI 410 stainless steel and welded construction.

Tank pressurizing is achieved by an unheated helium system with a charging pressure of approximately 4,350 p.s.i. No propellent-tank pressurization is required prior to the firing signal. The gas is contained in three spherical bottles.

Aft of the thrust-chamber assembly is the ejector and the fuel and oxidizer passages. The hypergolic propellents enter the chamber through concentric rings of injector orifices in an impinging-stream pattern.

The oxidizer, introduced midway along the bell-shaped expansion nozzle, is used as the coolant for the regeneratively cooled aluminium chamber. The latter is constructed of welded, tubular, cooling passages which permit "double-pass" oxidizer flow in the nozzle, from the inlet manifold aft to the attached uncooled extension, and "single-pass" flow forward from the inlet manifold, past the nozzle throat to the injector. Thus, wall temperatures are maintained below 500°F, whereas the combustion-gas temperature is approximately 4,500°F.

Varying the Thrust

For some missions, such as a low-altitude orbit with large payload, the thrust can be maintained continuously until the propellents are expended or until thrust is terminated by command. However, for higher-altitude circular orbits, the system may be operated for some initial time interval, shut down during a "coast" period, then operated again.

Command shut-down in all cases is effected by interrupting the firing signal. This de-energizes all three pilot valves, thereby causing the propellent valves and the propellent-tank helium shut-off valves to close. If a re-start is required after a coast period, it is accomplished by re-establishing the firing signal.

The terminal shut-down is effected by command or occurs as a result of propellent depletion. To obtain maximum total impulse and minimum burnout weight, propellent loading is biased to ensure the maximum probability of simultaneous runout or minimum residual propellent weight. Shut-down is then initiated by the oxidizer probe or by decaying thrust, as sensed by the thrust-chamber pressure switch; either will result in propellent valve closure.

A propellent-tank differential-pressure switch is included in the system as a safety feature. If, for any reason, the pressure in the fuel tank should exceed the pressure in the oxidizer tank by a predetermined amount, this switch will be activated and cause the fuel-tank vent valve to open.

The attitude-control system is capable of providing restoring moments for maintaining desired orientation throughout the trajectory. During powered flight, roll control is maintained by two solenoid valves which, on a given signal, admit nitrogen to either pair of roll-jet nozzles. Pitch and yaw control is maintained by means of the gimbal-mounted, thrust chamber, which is deflected hydraulically. On demand, two servo actuators located in the pitch and yaw planes transform a constant hydraulic pressure supplied by a motor-driven pump into an appropriate force which is applied to move the thrust chamber about the "monoball" up to 3° in any direction.

During coasting portions of flight, roll control is effected in the same manner as during powered flight. For axial stability, four pitch- and yaw-jet solenoid valves are operated intermittently, as required, to admit nitrogen separately or in combination to either the pitch- or yaw-jet nozzles. Immediately prior to a system re-start sequence, nitrogen is expelled through a pair of positive acceleration jets which provide a reactive force sufficient to settle the remaining propellents in the tanks.

Technical Data

Dimensions.—Overall length, 177.68 in.; propellent-tanks diameter, 54.8 in.; separation-plane diameter, 63.6 in.; oxidizer-tank volume, 65.51 cu. ft.; fuel-tank volume, 47.01 cu. ft.; helium-tank volume, 11.34 cu. ft.; nitrogen-tank volume, 0.89 cu. ft.

Weights.—Dry basic system, 920.5 lb.; total propellent, 8,474.3 lb.; helium, 29.2 lb.; nitrogen, 14.8 lb.; hydraulic fluid, 1.3 lb.; residual propellents, 24.0 lb.; nominal residual P.U. (bias), 20.4 lb.; residual helium, 29.2 lb.; residual nitrogen, 2.4 lb.; transient propellents, 73.1 lb.; accessory sub-systems, 63.6 lb., comprising: coast attitude control, 37.5 lb.; destruct sub-system, 3.6 lb.; instrumentation, 5.5 lb.; re-start acceleration system, 17.0 lb.

The Fighting Services

R.A.F. Staff College

AIR COMMODORE N. C. HYDE, C.B.E., has been appointed Commandant of the R.A.F. Staff College. Air Officer Commanding the Federation of Malaya Air Force for the past two years, he will take up the appointment in October.

In May, 1950, Air Cdre. Hyde became Chief Intelligence Officer at Headquarters, British Forces of Occupation, Germany, and in December, 1951, took command of R.A.F. Binbrook. He then became a Director of Operations at the Air Ministry and before going to Malaya was Commandant of the Central Flying School, Little Rissington.

Director of Movements

GROUP CAPTAIN S. G. WALKER, O.B.E., is to become Director of Movements at the Air Ministry with the acting rank of Air Cdre. In January of this year he was appointed Deputy Director.

Since 1945 he has served on disarmament duties at Headquarters, British Air Forces of Occupation, in Germany, and commanded maintenance units in the U.K. He has served on the directing staff of the R.A.F. Staff College, Bracknell, where he took the course in 1946, and completed the 1959 course at the Imperial Defence College.

Emergency Landings

TWO more R.A.F. airfields in the Mediterranean area—Luqa (Malta) and El Adem (Libya) will shortly be equipped to lay "foam carpets" for minimizing the fire risk during wheels-up landing. Akrotiri was the first station to standardize a practical method of laying foam on the runway, which proved its worth a year ago when a No. 13 Squadron Canberra used it to make a successful emergency landing. The aircraft was so little damaged that it was flying again in three weeks.

Since then continual improvements have been made, and it is reported that the Akrotiri foam strip can now be laid in less than half the time required for any other known system. The 1,000-yard strip can be prepared in 6½ min.—or 10 min. including the time it takes for the vehicles to travel from the fire section to the airfield. This clips 22 min. off the standard time taken for foam-laying at Waddington, where a Canberra with hydraulic failure made a successful landing on foam in August.

Nigerian Independence Celebrations

THREE Valiants of No. 7 Squadron (Wg. Cdr. B. P. Mugford) and four Jet Provosts from the Central Flying School, Little Rissington, supported by a Britannia and a Comet of Transport Command, are representing the R.A.F. at the Nigerian independence celebrations. The force is led by Air Vice-Marshal M. H. Dwyer, A.O.C., No. 3 Group.

On the day of the National Pageant, Sept. 29, the aircraft were to make a fly-past over the Lagos race course, and today the No. 216 Squadron Comet is to fly north to Kano to give flights to local dignitaries. On Oct. 1—Independence Day—the Valiants and Jet Provosts are to give flying displays at Sokoto, Kano and Joss, and a further display will be staged along the Lagos waterfront on Oct. 2 as part of the Water Pageant being organized by the Nigerian Government. The Service's visit will end with flights over provincial towns.

On Oct. 5 the C.F.S. team will fly to Accra, where, supported by a Varsity and Valettas, they will take part in a display for the Ghana Air Force.

VISITING MALAYA.—Recently, Air Marshal C. D. Selway, C.B., D.F.C., the new Commander-in-Chief, Far East Air Forces, made his first visit to R.A.A.F., Butterworth, Malaya. Here he is with the Officer Commanding, Butterworth, Air Cdre. G. C. Hartnell, C.B.E. (left), and Gp. Capt. I. F. Rose, A.F.C., the Officer Commanding No. 78 Fighter Wing.

AIRCENT Competition Results

FOR the third consecutive year the 1st R.C.A.F. Air Division carried off the Guynemer Trophy at the annual air firing competition organized by Allied Air Forces Central Europe at Cazaux Air Force Base. The final results showed that the Canadian team scored 1357.7 points; R.A.F. Germany came second with 1257.8 points, and Fighter Command was third with a score of 1240.5.

At the end of the 12-day contest Gen. M. Challe, Commander, A.A.F.C.E., presented the Guynemer Trophy to Flt. Lt. R. Spencer, captain of the R.C.A.F. team, and the U.S.A.F.E. cup to Flt. Lt. R. D. Stone, the R.A.F. Germany team captain.

R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

Air Ministry: Wg. Cdr. R. B. Harrison to the Department of the Air Member for Supply and Organization.

Bomber Command: Wg. Cdr. D. Clare, D.F.C., to R.A.F. Cottesmore as Wing Commander, Operations.

Maintenance Command: Wg. Cdr. A. McI. Peacock to Headquarters, No. 40 Group, for planning duties; Wg. Cdr. R. D. Stephens to No. 16 Maintenance Unit, Stafford, as Chief Equipment Officer.

Far East Air Force: Wg. Cdr. L. W. C. Lewis to Headquarters as Deputy Command Provost Marshal.

ARMY TRUCK.—Latest equipment to go into service with the Army Air Corps is the de Havilland Canada Beaver. Powered by a Pratt & Whitney R985, these craft are used as general purpose light transports and for liaison duties. The A.A.C. Beavers carry comprehensive radio including VHF, UHF, Decca, and other equipment.

Photograph copyright "The Aeroplane and Astronautics"

Aviation Art in London

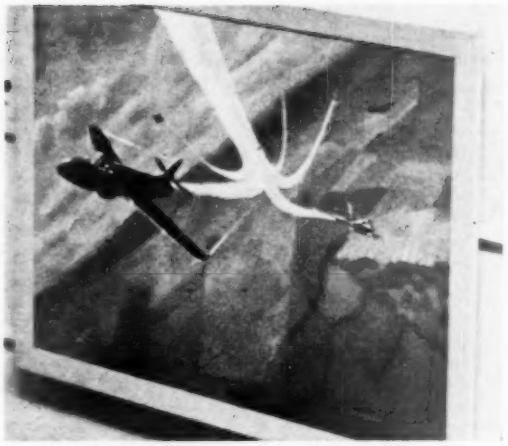
VISITORS to the seventh exhibition of the Society of Aviation Artists at Guildhall, London, which was opened by the Chief of Air Staff, Air Chief Marshal Sir Thomas Pike, on Sept. 20 in the presence of distinguished guests, are certain to find much to interest them, much to argue about and much to enjoy. Moreover, as the prices, even the highest, cannot be classified as astronomical, purchases may not only be contemplated but actually made without serious impoverishment. It is open from 10 to 5 daily, except Sundays.

No doubt the S.A.A. itself has a precise definition of an aviation artist, but even a cursory inspection of the 100 exhibits demonstrates that even if all aviation artists have a common denominator, they certainly, thank goodness, have characteristic approaches and, what is more important, a variety of interests as shown by the range of subjects. But the question remains unsolved. What is aviation art? Must aircraft be portrayed or aeronautical activity? Do views of the ground and sea seen from the air qualify? And what about cloudscapes? This year there are no studies of aircraft structures nor of power plant construction. Is this not a specialized form of aeronautical art? Talented artists in this field are few and far between.

There is, as is only to be expected, a marked tendency to portray precise types of aeroplanes either poised high in the sky or against some topical background. It is an obvious extension to make the picture not only a representation of a given type but of a given type in action. Many of our readers are familiar with the work of R. David Shepherd, who specializes in such representations. He has been making a tour of R.A.F. stations abroad and has portrayed some exciting incidents. Hardened by air travel, we liked the Beverleys over Mt. Kenya (No. 33).

Pictures of Spitfires and Hurricanes will always have their enthusiasts. C. W. E. Waller's Stormy Return (No. 28) was the first to find a purchaser. No. 58 by Harry Cooper, formerly on the editorial staff of THE AEROPLANE, is a fine example.

Difficult for the artist to handle are aerobatics. Two methods of tackling this problem are to be discerned in the lower gallery. No. 61 by Pamela Drew, discouraged some beholders because it has been freely drawn on aluminium sheet. We think it conveys the sweep and scale of the manœuvre successfully. Painted as from a vantage point in the sky, Bomb Burst (No. 66) by Arthur Sturgess is most effective if viewed from the gallery.



The dramatic effect of Arthur Sturgess' Bomb Burst (No. 66) is emphasized by this view of it.

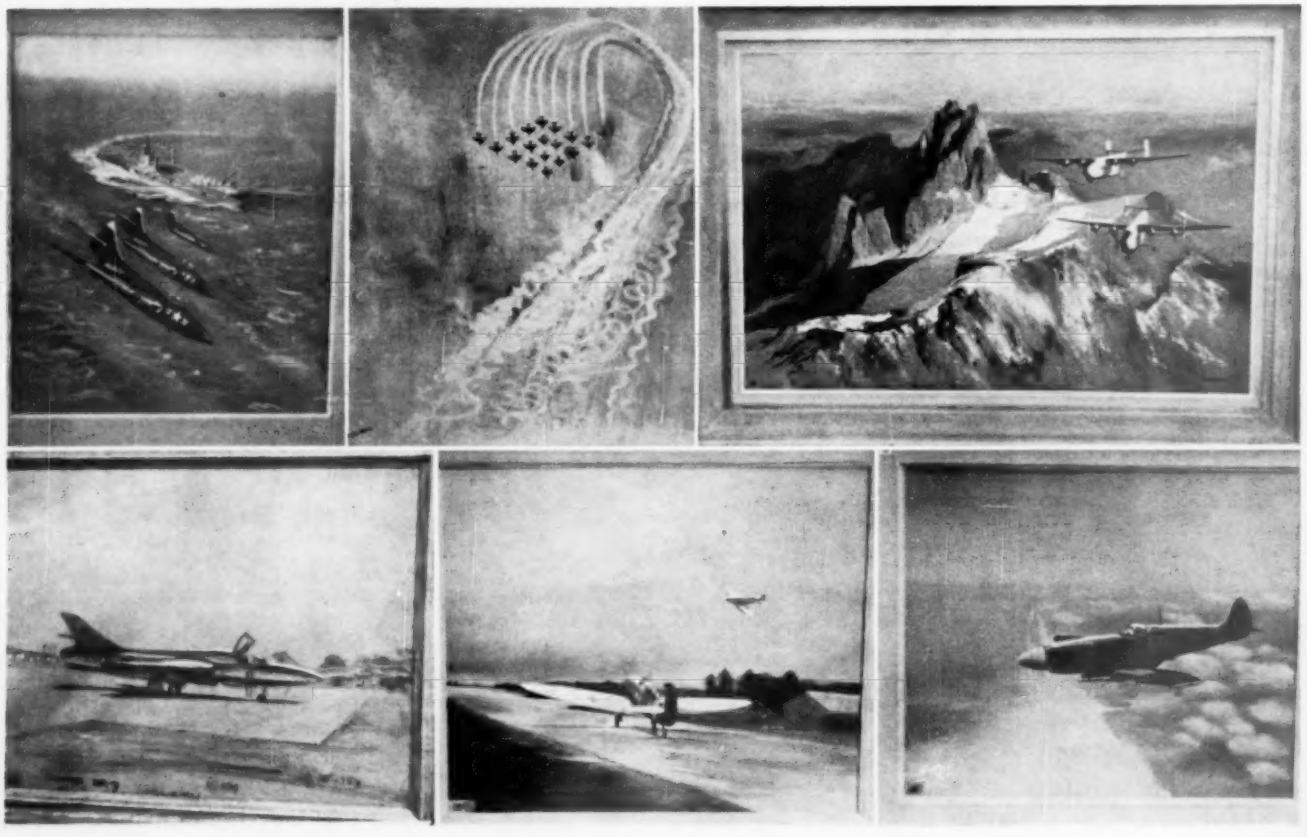
Besides the 70-odd paintings there are some 30 watercolours and drawings. We particularly liked the Hunter Mk. 7 reflecting the strong sunlight of a July day at Biggin Hill last summer. This pastel and the several others by Pamela Drew are very satisfying.

By way of violent contrast we must mention the attempts by Harold Dent to convey emotion or feeling engendered by the noise and vibration of modern aircraft. Deck Landing (No. 4) and Maximum Thrust (No. 10) should be studied in this light.

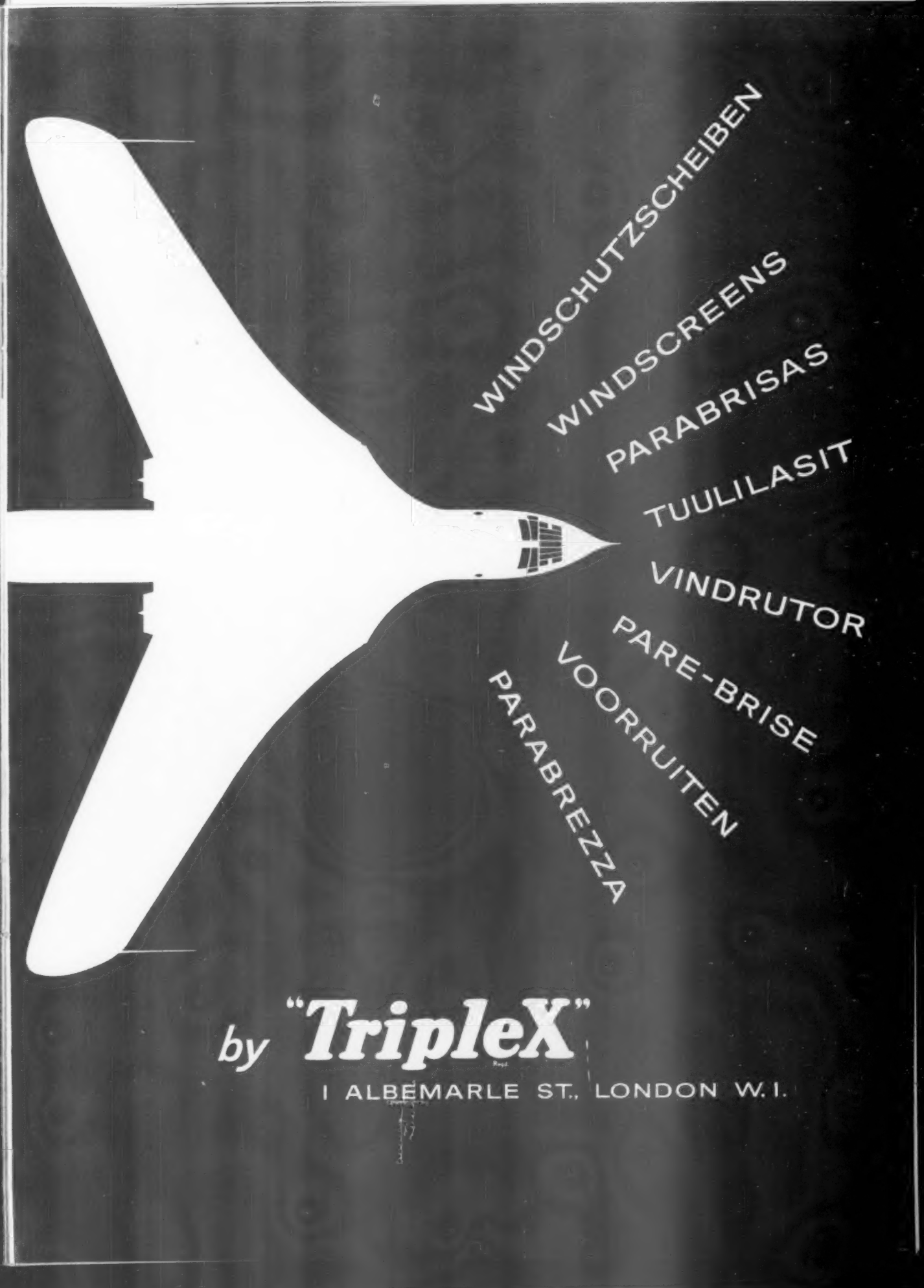
Claude Muncaster has a big painting (No. 35) of the Westland Heliport and its surroundings as seen from an approaching helicopter. We liked the first sketch for this (No. 13).

People seeking purely aviation subjects may overlook the work of Marit Aschan, but we found her choice of colour and the impressionist method of application satisfying.

Keith Shackleton is unfortunately only represented by studies of birds. What a pity that a practising aviator of such experience has given his fans nothing of aviation significance this year.—T.J.



From left to right, Rendezvous by Edmund Miller (83); No. 111 Squadron, R.A.F., Aerobatics by Pamela Drew (61); Mount Kenya, Beverleys of No. 30 Squadron by David Shepherd (33); Hunter Mark 7, 43 Squadron, R.A.F. by Pamela Drew (92); Stormy Return by C. W. E. Waller (28); Spitfire XII, No. 41 Squadron, 1943, by Harry Cooper (58).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New from Canada

Designed for specialized use, the Found FBA-2A, powered by a 250 b.h.p. Lycoming, is an attractive cantilever high-wing monoplane.

BUSH operators are closely following the development of a new Canadian lightplane—the FBA-2A, a tricycle-gear-version prototype of which is currently undergoing flight testing. Designed and built by Found Brothers Aviation, Ltd., Malton, Ontario, the FBA-2A first flew on Aug. 11 and has accumulated some 20 hr. of flight time to date.

The FBA-2A is essentially a functional aircraft; a high-lift wing provides the short take-off performance and steep approach angles needed for bush operations. The wing is fully cantilevered—to permit free access for cabin loading and improved handling around docks during low water, while operating on floats. Quickly removable seats and four large doors are arranged for ease of handling bulky freight; and a rugged wide-track landing gear provides positive ground control and stability. With a square-sided cabin having a volume of 90.4 cu. ft., four/five occupants, or the equivalent cargo, are easily accommodated.

Power is provided by a Lycoming 0-540-A1D developing 250 b.h.p. at 2,575 r.p.m. driving a 74-in.-dia. McCauley variable pitch propeller.

Construction is metal throughout the aircraft with Alclad being used for covering. The wing has a D-type spar with I beam spar web; the ailerons and flaps have U-shaped spars. Maximum wing thickness is 11 in. and the outer portions can be removed by undoing external bolts. The fuselage is a steel tube structure with four main longerons. The tail structure is similar to that of the wing. All controls are cable actuated.

The landing gear has been stressed for loads double those of the certification requirements. The main gear has a cantilever rubber shock absorber unit using a main strut of box construction, plus a drag strut. The nose gear is of the lever suspension type with rubber shock absorber and is self-centring and fully castoring without rudder tie-in. All three tyres are 600 x 6 units.

With this undercarriage, ground clearance is 20 in. at the rear seat position. The overall landing gear track is 8 ft. 6 in.

The prototype is being used for flight test and finalization of the design features of the FBA-2 series and certification will be carried out on the second craft. This will be the production version and is already under construction.

Found Brothers Aviation has been making components and parts for aircraft over 15 years, as well as doing research work for a number of major Canadian aviation concerns. The FBA-2 is a development of the company's FBA-1 which first flew in 1949 and was used to prove the basic design concept for the type.

Wing span of the FBA-2A is 36 ft. and the gross area 180 sq. ft. Its overall length is 24.37 ft. and height 9.13 ft. Aileron area is 15.70 sq. ft., rudder area 5.88 sq. ft. and elevator area 12.88 sq. ft. The mechanically operated flaps have a total area of 22.35 sq. ft. and deflect 45°.

HOWARD LEVY.

Below left, a somewhat unorthodox but rugged main wheel leg has been chosen to cope with rough operation from unprepared areas; it uses a rubber shock absorber unit. Below, four doors give access to the cabin which can accommodate 4-5 passengers or comparatively bulky freight loads.

Flying the Auster D.6

by John Fricker

VISITORS to the recent S.B.A.C. Show were given the opportunity to inspect, although not to see fly, two examples of the new Auster "D" range—the two-seat D.4/108 and the four-seat D.6/180. These represent the extremes of the 10 or more available types within that range, with Lycoming engines of 108 to 180 b.h.p., and—as I explained in our issue of May 6 this year after flying the little D.4—with 32- or 36-ft.-span wings. They have taken development of the well-tried Auster airframes a stage further in the highly competitive U.K. and overseas markets in which they can offer a considerable improvement, but by no means have they reached their ultimate in progression.

For example, the D.6 retains the standard, rather narrow front entrance doors for both sets of seats, with no external access for baggage loading, and the bungee-sprung tailwheel undercarriage. The tailwheel leaf-spring, however, has an hydraulic damper, while the list of other improvements becomes most impressive as one encounters the completely revised cockpit, with a new panel and luxurious furnishings, the strut-end fairings and other streamlining fittings such as moulded mainwheel spats and tailwheel leg cover.

The two-tone pink and black high-gloss fabric finish in Butyrate dope of the D.6 on show is eye-catching as well as enduring, while less obvious, but perhaps more important for durability, is the introduction of metal instead of wooden main spars. In general, the steel-tube fuselage is similar to that of the original Auster Autocar, but the cabin has been widened by a couple of inches for extra comfort.

Aerodynamic improvements are confined to installation of the Workmaster-type fin and rudder, standard on the "D" series, and an Aiglet Trainer-type ball-race aileron circuit, plus the various speed fairings. The 180-b.h.p. Lycoming O-360-A1A, which is interchangeable with a 160-b.h.p. power-plant in the D.6, is also closely cowled. The rear cabin is roofed with glassfibre, instead of the former Perspex, and should be both cooler and quieter.

Extra space is gained in the front cabin by relocation of the instrument panel farther forward, but as this is rather higher than in earlier Austers, the forward view is correspondingly restricted. The square corners of the panel also tend to intrude in the sidescreens, to the detriment of taxi-ing visibility.

These features apart, the D.6 is very much an Auster in its general configuration. Such items as heel brake pedals, flap lever and trim crank were all to be found in their familiar places, as I settled down in G-ARDJ during my private preview before it flew to Farnborough. I needed a back cushion on the non-adjustable seat to reach the rudder pedals in comfort, but it is possible to inflate the rear cushion a little harder to achieve the same effect.

On being shown round the cockpit by Ranald Porteous, I noticed that, apart from the revised panel, one of the few noticeable changes was to be seen in the curved, instead of cranked, control columns. My personal preference is for a stick rather than a wheel, but it seems to be generally acknowledged that for the next stage of development, control handwheels will be *de rigueur*.

Instrument layout in the D.6 is quite straightforward, with a full panel to port, and engine references beneath. G-ARDJ is fitted with representative NARCO VHF equipment, with VOR facilities, and below the selector boxes in the centre panel are the plungers for throttle, mixture and (since a McCauley constant-speed airscrew is fitted to 'DJ as an alternative to a fixed-pitch type) for r.p.m. control. The pitch plunger has the usual vernier twist control for fine adjustment, and the alternative button lock for coarse movement need seldom be used.

The Lycoming starts with a pleasantly muffled roar, and a twist of the parking brake knob, in place of the former hand-brake, clears one for taxi-ing. On rough grass, the D.6 had a substantially solid feel, despite its undamped bungee springing, but although the tailwheel steering connection aids ground manœuvrability, it does not seem sufficiently positive.

During the pre-flight checks I noticed one slight difference in the elimination of the middle one of the three flap notches, but this was rarely used. Flying solo, with some 200 lb. of baggage in the rear-seat area, and with both 16-gal. wing-root tanks full, I selected slight nose-down trim via the roof crank and take-off flap of 25° to reduce the ground run. This proved to be remarkably short, on opening the throttle to full power of 28.5 in. Hg and 2,700 r.p.m., with a touch of right rudder to check a mild incipient swing.

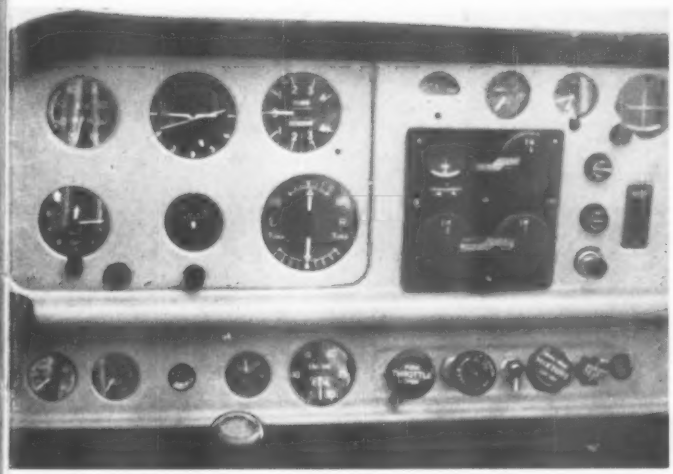
Acceleration is rapid and there is a pleasant impression of power in hand. I climbed straight up to 5,000 ft. from take-off into a clear, late-summer sky, to try the D.6 at somewhere near its rated height. Without trying for a maximum climb, I timed it to 3,000 ft. in 3½ min., from brakes off, and six minutes to the selected altitude, maintaining 75-80 m.p.h. For cruising power of 24 in. Hg and 2,450 r.p.m., it was barely necessary to throttle back, and a few twists of the pitch knob brought the revs. back to the required figure.

At this fairly high continuous cruise setting the D.6 settled down to indicate 130 m.p.h., giving a T.A.S. approaching 140 m.p.h. As one might expect from the increased power compared with earlier Austers, longitudinal trim changes were moderately pronounced at varying speeds and throttle settings, but the little roof trimmer is very sensitive and effective at all times. The D.6 is quite stable and has a "big-plane" feel about its handling, which is very pleasant. Control harmonization is good, the ailerons being typical in requiring moderate operating forces, but are crisp and effective in response.

Only the lightest touch of rudder is needed to achieve accurate turns and, coupled with the substantial reduction in noise level, the simple flying characteristics of the D.6 should assist in reducing fatigue. Further aids to creature comfort include potent pull-out tube ventilators of the type fitted to some American aircraft, in the wing-root leading-edges and, of course, cabin heat. The usual sliding side windows are retained, and the cabin is tolerably draught-proof.

On throttling back to try out the low-speed handling, I found

A recent addition to the Auster range, the four-seat D.6 is powered by a 180-b.h.p. Lycoming. It has a wider fuselage than the Autocar and a Workmaster-type fin and rudder.



Instrument panel and layout in the Auster D.6 are completely revised. Provision has been made for installation of extensive radio equipment.

that the nose dropped accordingly, which is a required safety feature, but only a small clockwise movement of the trim crank was needed to maintain a 65-m.p.h. glide. Full aft stick movement reduced speed still further until, at about 45 m.p.h. I.A.S., the clean stall came with little warning and little effect, other than a mild nose and starboard wing drop. Loss of height was negligible, and the flap down, power-on stall was equally innocuous. Breakaway then came at about 35 m.p.h. I.A.S.

Flap limit speed is 75 m.p.h., and 50 deg. extension results in a moderate nose-down trim change. From a trimmed speed of 65 m.p.h. in the approach configuration, I opened up to full power to check the usual nose-up tendency when overshooting, and although this was quite evident, it was also quite manageable with one hand. Auster flaps have always been effective, and they are unchanged on the D.6.

I made a guess at the turn-in position for a power-off approach at 65 m.p.h., but the full 50 deg. of flap gave a steeper glide path than I had anticipated, and I had to add a little power on finals to avoid an undershoot into Stapleford. Nowadays, power-on approaches are less reprehensible than they used to be, which is a good thing, especially as I nearly always try glide approaches initially on a new type, and quite often guess wrong. With small airfields, it is difficult to assess the effect of final flap movement on the approach path, but it is always good fun trying to judge a simulated power-off landing, and perhaps even useful experience.

The D.6 rumbled in quite happily over the hedge at 60 m.p.h., and although I had more or less to feel the aircraft down right in the eye of the setting sun, this presented little difficulty. As usual with Austers, it was necessary to get the control column back on its aft stop just before touchdown, but provided the stick is kept clutched against one's tum throughout the short landing run, the springy undercarriage will not be allowed to develop a bounce.

Price of the D.6 varies between about £4,400 and £4,800, according to external finish and equipment, and this range, of course, is rather below American aircraft of comparable capacity and versatility. With continued development, the Auster company should become an even stronger defender of our skies against the invasion by the shiny and imaginative products of foreign manufacturers.

Leading Particulars

Dimensions.—Span, 36 ft.; length, 23 ft. 4½ in.; height, 7 ft. 11 in.; wing area, 185 sq. ft.

Weights.—Empty, 1,498 lb.; fuel (32 gal.), 230 lb.; oil (2 gal.), 13 lb.; pilot, 170 lb.; radio, 42 lb.; max. commercial load, 542 lb.; max. gross, 2,500 lb.

Performance.—Max. speed, 138 m.p.h.; max. cruise, 133 m.p.h.; initial climb, 850 ft./min.; take-off run, 690 ft.; to 50 ft., 1,680 ft.; range at max. cruise, 490 miles.

Personal Flying

PRIVATE pilots have perhaps been unprepared for the flood of new American lightweight radio equipment now reaching this country, and many of them are undoubtedly unaware of the use to which this may be put. More than a small percentage, in fact, are probably unable to discuss the relative merits of VHF, as against LF or MF, radio navigation, or indeed the virtues of this type of cross-country aid itself, since only a handful of club aircraft are yet so equipped.

With executive and personal aeroplanes, which have this lavish equipment, their pilots have had time to settle down with the complications of VOR, ADF, marker and locator beacons, localizer and glide path systems and so on. Amateur pilots can now have the same opportunity, without going to the expense of buying or flying a suitably equipped aircraft, with the help of some long-playing gramophone records which have just been introduced into this country from the U.S.

The London Aero Club, Ltd., are agents for Aero-Progress, Inc., of Los Angeles, Calif., producers of a complete instrument flying course on records. Three of these 33⅓ r.p.m. high-fidelity recordings are available covering the complete range of procedures involved in radio navigation, as indicated by their titles, in order of progression, of "Tower Communications," "On Course, on the Glide Path" and "Instrument Flight."

Although these relate specifically to American equipment and procedures, most are now common in the U.K., and nearly all the information contained in these records is of value to the British pilot. Having had the opportunity to study two of the three recordings, the value of aural representation of various radio aids becomes evident, although each record is also accompanied by a printed brochure containing illustrative and explanatory material.

We have not yet heard "Tower Communications," which is the most basic of the three, but "On Course, on the Glide Path," selling for a similar price of 63s., takes the listener on a conducted tour of the most widely used radio aids available to the personal and executive pilot. It is introduced by the final stages of a GCA approach, and goes on into the basic technicalities of VOR (VHF omni-ranges), LF radio ranges and beacons, ADF radio compasses and ILS. You hear the characteristic sounds of the identification signals of most of this equipment, plus such things as the cone of silence in the radio ranges, Z-markers, outer and middle markers and so on.

The third record "Instrument Flight," which retails for 75s., is very much more advanced, and takes one through an entire IFR flight from Los Angeles to San Francisco. As one might expect from one of the most aerially congested areas in the World, the procedures involved in flying airways in this region are extremely complex, but the record conducts the listener from the initial discussion of met. conditions at L.A. with the weather man right through all the control and reporting radio interchange, using VOR to an ILS approach at San Francisco.

The principal ground instructions are set out in the accompanying brochure, together with appropriate indications on the twin VOR dials, and repeated playing of this record should eventually result in a thorough mastery of the most complicated procedures likely to be encountered. This is undoubtedly the main advantage of such records, which make an excellent backing to the strictly theoretical approach of the normal textbooks. All are available from the London Aero Club at Panshanger, Herts, or from John Somers, Ltd., at 142 Edgware Road, W.2, and Charing Cross Road, W.C.2.

• • •

On Saturday, September 17, the London School of Flying held its annual presentation of prizes for the summer competitions. The Navigation and Aerobatic contests were won by T. A. Davies, who learned to fly at Elstree four years ago and has now amassed over 400 hours. The Technical Knowledge and Circuit Competition was won by Peter Laffy, and the Forced Landing by Nigel Brown. The Student Pilot's Trophy went to Dr. H. F. Gallagher, who also had the distinction of being the first student ever to have won the Championship Award. In the past the winner had always been the holder of a P.P.L.

Other news is that the School's refurbished Auster J/IN, G-AGXT, is now in service behind the power of a Gipsy Major 1c's 145 horses. This gives an initial rate of climb of 1000 ft./min. and a shock to those accustomed to a Cirrus Minor. This is apparently the first aircraft of its type to be fitted with a Major 1c, and considerable difficulty was experienced in getting the machine cleared by A.R.B.

On Tuesday, September 13, 10 new students started training with the Elstree Air Centre on a full-time seven months' course for their professional pilots' licences. This has been the only course started this year, training being concentrated largely on private pilots, but there will be another intake in March or May of next year and applications for this are already being accepted.

Correspondence

Heavier than the Stirling

IN the introduction of the publication "Before the Britannia" by D. L. Brown (Aug. 19) he wrote:—

"The heaviest aircraft, British, American or German, then in service was the Short Stirling with an a.u.w. of 70,000 lb."

If he includes the aircraft developed and constructed in Germany, that paragraph is not quite correct. Hamburger Flugzeugbau constructed at that time aircraft to operate a service non-stop between Germany and the United States of America. This type was a flying-boat, the BV 238, which was used as a marine reconnaissance aircraft by the German Air Force. We think this was the heaviest aircraft at that time, with an all-up weight of 198,500 lb., six engines with a total b.h.p. of 10,700, and a range of 4,000 miles.

HAMBURGER FLUGZEUGBAU GMBH.

Hamburg-Finkenwerder.

Canadian Inquiry for Chilton

FOR some time past I have been most interested in the Chilton-type DW1A aircraft. I am aware of the fact that only one such machine has been produced; indeed, it had been made shortly before World War II. I understand that, although the machine has been recently modified, it still flies regularly in England. This machine has an all-wood structure with plywood skin. It has a single in-line motor and is a low-wing monoplane with fixed spats and undercarriage and, I believe, it has a tail skid beneath the fin in place of the conventional tail-wheel of today.

It is of the utmost importance to me to be able to contact someone closely associated with the ownership of the present machine or, if possible, to be able to contact the manufacturer of this machine. I believe its registration is G-AFSV.

Any information which could be sent to me here at 548 King Street, E., will be greatly appreciated.

Kitchener, Ont., Canada. J. W. E. CRANE.

Farthings for R.A.F. Fund

WITH the current level of prices, few people will miss the estimated 200 million farthings that are to be withdrawn from circulation. We at the R.A.F. Benevolent Fund know a great deal about the rise in the cost of living that has made this tiny coin an anachronism. It is also one of the factors causing us to spend about £1,400 a day on relief of distress among serving and ex-Service personnel.

I therefore suggest that your readers might care to send their now useless farthings to the R.A.F. Benevolent Fund, 67 Portland Place, London, W.1. We can cash them in and put the money to good use in this year that marks the 20th anniversary of the Battle of Britain.

London, W.1. JOHN W. CORDINGLEY (Controller).

Support for the Veterans Day

I WAS very interested to see the article by Wren in his Wroundabout (THE AEROPLANE AND ASTRONAUTICS, Aug. 12) concerning the Shuttleworth Trust.

I entirely agree with his ideas about a Veterans Day. If such a meeting could be arranged I am sure that a large sum of money in the form of admission charges could be collected and passed on to help pay for the restoration of some of the historic aircraft in the country.

The Shuttleworth Trust would, of course, form a wonderful background for such a meeting. The newly restored Nash collection would also prove a great attraction.

The now well-known Quill and Bedford Spitfire and Hurricane dog-fight would, of course, be a "must" for an aircraft rally of this type. Perhaps even the Royal Air Force could be persuaded to send along some of the Spitfires and the Hurricanes from the Battle of Britain Flight. Such a gathering would not be complete without either the Royal Navy or Fairey Swordfish; and, perhaps, the Fulmar of "Sink the Bismarck" fame.

Displays of this kind—or "Fly-ins" as they are called—are held in America by the Antique Airplane Association and I do not see why one of the founder countries of aviation could not also organize something. At the moment the only chance for anybody to see any of these aircraft is at displays and there, probably, only in the air.

I suggest that a display should be arranged under the direction of the Royal Aero Club and owners of historic aircraft invited to attend. If a small charge were to be made, say 5s., quite a sizeable amount could be collected for the preservation of these interesting and historic aircraft.

I appeal to somebody with authority to try to organize such a display.

London, E.4. G. P. TRANT.

Super Electras and other Veterans

I SHOULD like to thank your correspondent, Hugh K. Batchelor, for his letter published in your May 13 issue. However, despite Mr. Batchelor's own comments in which he claims "there never was a Lockheed Super Electra," I stand by my original statement that the Model 14 was widely known throughout the World as the Super Electra; even Lockheeds themselves publicized this name apart from a number of airlines (including British Airways, Ltd.) who followed suit. Mr. A. J. Jackson's current Volume 2 of his superb "British Civil Aircraft, 1919-59" likewise refers to the Model 14 as being known as the Super Electra.

Regarding the Constellation, Model 749A, CN.2671 which

Wroundabout

It Could Happen. And it did, I'm told. In the course of anti-icing trials on a certain turbine engine, the engineers found the water supply to the spray-bar froze before it reached the nozzles. After much applied thought, a genius, no doubt with experience of cracked cylinder blocks, suggested "How about adding anti-freeze to the water!" This met with unanimous approval and the subsequent trials were an outstanding success. Not a sign of ice anywhere. It was only after an analysis of the peculiar blue staining of the compressor blades of the first engine to undergo a routine inspection that the horrid truth dawned. Anybody got any ideas on how one could squirt anti-icing fluid ahead of an aircraft?

✶

Shapes of Things. A depressed spotting friend wants to know how to distinguish the Boeing 707 from the DC-8. Well, first there are the airline markings; then Boeing's have thoughtfully put that spiky thing at their fin top, while Douglas help with a couple of little air intakes under the DC-8's nose; and there are the A.R.B.O.A.C. fins-ain't-what-they-used-to-be 707s. Otherwise, I suggest you stuff your fingers in your ears, be grateful that Convair 880s don't operate over here, and nostalge over the good old Constellation, DC-6 and Stratocruiser days.

✶

End of the Tell-Trail. And I have more bad news for spotters. Their last hope of locating and identifying the high-flying types looks like vanishing, literally. The thoughtless chemists have found that by injecting dust particles into the jet efflux, they can eliminate con-trails. Oh, well.

✶

Calling All Web-Foots. Would you like to invest in a piece of Sunderland? If so, send a donation to Mr. P. F. Thomas, of Cardigan, Wales. He seems to be doing well, deservedly, in his scheme to preserve one of the lovely old ladies. I wonder if that giant Latécoère (?) flying boat is still preserved on the slipway at Marignane? And if the Sandringham café (oh shame!) is still operating on its cement stand down in New Zealand?

✶

Vintage. George Errington has tested, demonstrated, delivered and sold de Havilland aeroplanes around the World for many years. He happened to be passing England the other day, so he dropped in to demonstrate and deliver what he assured me was a well-tested jest. Subject: George's passing years. When he was asked by Air Traffic Control to pass some instrumental information, he replied that there would be a short delay before he could supply it, as his spectacles were mixed up with his ear-trumpet, a condition, says George known as QSET. Jest bought.

by Wren

was acquired by B.O.A.C. in 1954, becoming G-ANNT on the U.K. Register; it's certainly news to me that this aeroplane was owned by Howard Hughes prior to it being sold to B.O.A.C. According to my records, plus checking at least three other independent sources, this Constellation at the time of its sale to the U.K. concern was owned by T.W.A., registration being N6025C, its name being "Star of Colorado." When sold by B.O.A.C., it went to Capitol Airways Inc. and, so far as I'm aware, is still operated in the U.S.A., registered N4901C.

Special thanks to Mr. F. Zandvliet of K.L.M. Public Relations (Jly. 15) for correcting my data on the former K.L.M. Fokker F-22, PH-AJP, whose name I wrongly gave as "Roerdomp" instead of "Papegaai" although the aircraft's correct registration was recorded in my original letter!

Regarding Mr. Zandvliet's comments on the B.E.A. DC-3 G-AGHJ, I should like to assure him I was indeed well aware of all the former K.L.M. DC-3s shown in his detailed list, including their wartime U.K. registrations and post-1945 histories. Unfortunately, I omitted to insert the word "current" before the words "U.K. Register."

In conclusion, G-AGHJ has, in fact, been the "first" DC-3 on the U.K. Register since 1954, its R.A.F. serial was FD.867, it was built at Santa Monica early in 1943 as a C-47A-DO, CN.9413 and was acquired by B.O.A.C. the same year, going to B.E.A. on Aug. 1, 1946.

May I also thank Mr. David Jones (Jly. 8) for bringing up to date my notes on the veteran Viking, G-AHOP.

Nairobi, Kenya. D. M. POWELL.

[The difference between ownership by Howard Hughes and by T.W.A. is, in this context, academic. The majority of T.W.A.'s fleet is leased from Hughes, who has a 70% interest in the airline.—ED.]

Unique Civil Mosquitoes

MR. D. M. DAVIES' remarks in his letter "Icing Investigations" (Sept. 16) suggesting that the two B.E.A. Mosquitoes were unique in having obtained civil certification prompt me to ask whether the Mosquitoes operated by B.O.A.C. in 1944 on the Leuchars/Stockholm route had received similar certification. I made one trip, as a passenger, in one of these aircraft in August of that year and vaguely recollect that it bore a civil registration, but apart from this (and the temporary arrangements for carrying one passenger in the bomb-bay) it appeared to be a standard R.A.F. aircraft. The crew too seemed to be wearing a proportion of R.A.F. clothing, but presumably their sports coats and felt hats together with the civil registration letters on the Mosquito were sufficient to satisfy Swedish neutrality at that stage in the War.

As my first-ever flight, I shall not forget that trip. I will always remember the quiet efficiency of the B.O.A.C. staff in getting me into the bomb-bay, plugging in the oxygen and shutting the doors before I could ask about means of exit in an emergency!

Amersham, Bucks. H. M. BULL.

Gliding Notes

by Dr. A. E. Slater

A HEIGHT record from Pakistan has been set up by Flt. Lt. Colin Richardson, formerly of the London Gliding Club and now at the Pakistan Air Force College at Risalpur. He managed to get a lift by car to Quetta, where there is a gliding club run by Sqn. Ldr. J. Z. Mikulski, one of Poland's leading glider pilots in pre-War days.

There Richardson found himself in a basin 20 miles across, nearly surrounded by 12,000-ft. mountains. Dust devils started up at 11.00 hrs. but were too narrow to circle in, and there were terrific downcurrents between them. But by noon conditions were suitable for launch by auto-tow along a 4,000-yd. runway with a 75% probability of connecting with a thermal. Cumulus clouds, when present, had bases at 18,000 ft. He climbed to 22,000 ft. a.s.l. but his gain of height, though enough to qualify for Gold "C," was less than the 16,400 ft. needed to earn a Diamond.

* * *

THERE was a time when soaring flights in thunderstorms and other cu-nims were unusual events, and the greatest risk was that of losing control, subjecting the glider to structural failure and having to jump for it. Several pilots did so in a thunderstorm over the Wasserkuppe during the German national contests of 1938; one was afterwards hit by his sailplane, and another carried up instead of down by his parachute, lost two fingers from frostbite.

Nowadays, with good blind-flying equipment and airbrakes, cu-nim flights are commonplace, and their most disturbing feature appears to be electric shocks from lightning. But turbulence, hail and icing can also be unpleasant, as Flt. Lt. Brian Carroll found when he flew a Skylark 3b into a cu-nim near Bicester on Aug. 27 in search of "Diamond" height (5,000 metres, 16,404 ft.).

The unpleasantness drove him out of the cloud twice—the second time at 11,000 ft. Then, having sunk to 7,000 ft., he charged into a dark, thick shelf projecting from a thunderstorm, climbed at 12½ ft./sec., and was soon receiving electric shocks through the stick and pedals. Then came a severe shock which caused him to pass out for a few seconds.

Next the airbrakes became frozen in and the trimmer froze in such a position that he had to push hard on the stick to keep flying speed, what with the tail being heavy with ice and the wings badly iced as well. It took 20 minutes of straight flying to come out of the cloud. The barograph showed a maximum height of 16,000 ft.

On the same day some pilots at Lasham reached 11,000 ft., and the same height was reached next day by C. W. Bentson on a flight from Dunstable to St. Neots and back, just after passing Henlow on the return journey. His cu-nim lifted him at 33 ft./sec.

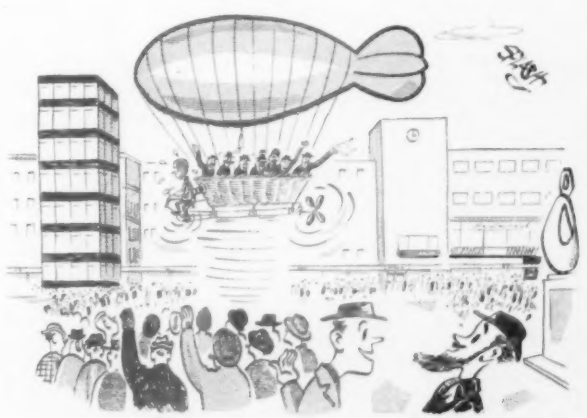
Cu-nims were again in use a week later, when on Sept. 4 Mike Fairman took a Skylark 3 to 10,700 ft. after release from tow at 700 ft. (above take-off) near Dunstable. A few miles to the west of the London club site is an elongated triangle between two airways to the N.E. and S.W. and the London control zone to the S.E. The wind was blowing along it, so Fairman got into his cu-nim at the sharp end near Wing and came out short of the blunt end near Cheddington.

* * *

"AUSTRALIAN GLIDING," now in its 9th year, has had so many requests to publish articles on light and ultra-light aeroplanes that the Editor, Allan Ash, rather than scandalize the purists by so doing, has started a new monthly magazine called *Airsport*. This, unlike *Australian Gliding*, is being run on a commercial basis; the latter has resumed publication after a four months' interval, and is being printed instead of lithographed, so as to save the Editor's time, though it costs more to produce.

* * *

EDMUND SCHNEIDER, the chief designer of the Grunau Baby, who emigrated to Australia after the War and started a glider factory near Adelaide, has returned to Germany to join Wolf Hirth's old firm, known as Schempp-Hirth. Martin Schempp, rather similarly, though at an earlier date, emigrated to the United States and then returned to join Hirth. The Australian factory will be carried on by Schneider's son, Harry.



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HAMBURGER FLUGZEUGBAU GMBH.
Hamburg-Finkenwerder.

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FOR some time past I have been most interested in the Chilton-type DW1A aircraft. I am aware of the fact that only one such machine has been produced; indeed, it had been made shortly before World War II. I understand that, although the machine has been recently modified, it still flies regularly in England. This machine has an all-wood structure with plywood skin. It has a single in-line motor and is a low-wing monoplane with fixed spats and undercarriage and, I believe, it has a tail skid beneath the fin in place of the conventional tail-wheel of today.

It is of the utmost importance to me to be able to contact someone closely associated with the ownership of the present machine or, if possible, to be able to contact the manufacturer of this machine. I believe its registration is G-AFSV.

Any information which could be sent to me here at 548 King Street, E., will be greatly appreciated.

Kitchener, Ont., Canada. J. W. E. CRANE.

Farthings for R.A.F. Fund

WITH the current level of prices, few people will miss the estimated 200 million farthings that are to be withdrawn from circulation. We at the R.A.F. Benevolent Fund know a great deal about the rise in the cost of living that has made this tiny coin an anachronism. It is also one of the factors causing us to spend about £1,400 a day on relief of distress among serving and ex-Service personnel.

I therefore suggest that your readers might care to send their now useless farthings to the R.A.F. Benevolent Fund, 67 Portland Place, London, W.1. We can cash them in and put the money to good use in this year that marks the 20th anniversary of the Battle of Britain.

London, W.1. JOHN W. CORDINGLEY (Controller).

Support for the Veterans Day

I WAS very interested to see the article by Wren in his Wroundabout (THE AEROPLANE AND ASTRONAUTICS, Aug. 12) concerning the Shuttleworth Trust.

I entirely agree with his ideas about a Veterans Day. If such a meeting could be arranged I am sure that a large sum of money in the form of admission charges could be collected and passed on to help pay for the restoration of some of the historic aircraft in the country.

The Shuttleworth Trust would, of course, form a wonderful background for such a meeting. The newly restored Nash collection would also prove a great attraction.

The now well-known Quill and Bedford Spitfire and Hurricane dog-fight would, of course, be a "must" for an aircraft rally of this type. Perhaps even the Royal Air Force could be persuaded to send along some of the Spitfires and the Hurricanes from the Battle of Britain Flight. Such a gathering would not be complete without either the Royal Navy or Fairey Swordfish; and, perhaps, the Fulmar of "Sink the Bismarck" fame.

Displays of this kind—or "Fly-ins" as they are called—are held in America by the Antique Airplane Association and I do not see why one of the founder countries of aviation could not also organize something. At the moment the only chance for anybody to see any of these aircraft is at displays and there, probably, only in the air.

I suggest that a display should be arranged under the direction of the Royal Aero Club and owners of historic aircraft invited to attend. If a small charge were to be made, say 5s., quite a sizeable amount could be collected for the preservation of these interesting and historic aircraft.

I appeal to somebody with authority to try to organize such a display.

London, E.4. G. P. TRANT.

Super Electras and other Veterans

I SHOULD like to thank your correspondent, Hugh K. Batchelor, for his letter published in your May 13 issue. However, despite Mr. Batchelor's own comments in which he claims "there never was a Lockheed Super Electra," I stand by my original statement that the Model 14 was widely known throughout the World as the Super Electra; even Lockheeds themselves publicized this name apart from a number of airlines (including British Airways, Ltd.) who followed suit. Mr. A. J. Jackson's current Volume 2 of his superb "British Civil Aircraft, 1919-59" likewise refers to the Model 14 as being known as the Super Electra.

Regarding the Constellation, Model 749A, CN.2671 which

Wroundabout

It Could Happen. And it did, I'm told. In the course of anti-icing trials on a certain turbine engine, the engineers found the water supply to the spray-bar froze before it reached the nozzles. After much applied thought, a genius, no doubt with experience of cracked cylinder blocks, suggested "How about adding anti-freeze to the water!" This met with unanimous approval and the subsequent trials were an outstanding success. Not a sign of ice anywhere. It was only after an analysis of the peculiar blue staining of the compressor blades of the first engine to undergo a routine inspection that the horrid truth dawned. Anybody got any ideas on how one could squirt anti-icing fluid ahead of an aircraft?

*

Shapes of Things. A depressed spotting friend wants to know how to distinguish the Boeing 707 from the DC-8. Well, first there are the airline markings; then Boeing's have thoughtfully put that spiky thing at their fin top, while Douglas help with a couple of little air intakes under the DC-8's nose; and there are the A.R.B.O.A.C. fins-ain't-what-they-used-to-be 707s. Otherwise, I suggest you stuff your fingers in your ears, be grateful that Convair 880s don't operate over here, and nostalge over the good old Constellation, DC-6 and Stratocruiser days.

*

End of the Tell-Trail. And I have more bad news for spotters. Their last hope of locating and identifying the high-flying types looks like vanishing, literally. The thoughtless chemists have found that by injecting dust particles into the jet efflux, they can eliminate con-trails. Oh, well.

*

Calling All Web-Foots. Would you like to invest in a piece of Sunderland? If so, send a donation to Mr. P. F. Thomas, of Cardigan, Wales. He seems to be doing well, deservedly, in his scheme to preserve one of the lovely old ladies. I wonder if that giant Latécoère (?) flying boat is still preserved on the slipway at Marignane? And if the Sandringham café (oh shame!) is still operating on its cement stand down in New Zealand?

*

Vintage. George Errington has tested, demonstrated, delivered and sold de Havilland aeroplanes around the World for many years. He happened to be passing England the other day, so he dropped in to demonstrate and deliver what he assured me was a well-tested jest. Subject: George's passing years. When he was asked by Air Traffic Control to pass some instrumental information, he replied that there would be a short delay before he could supply it, as his spectacles were mixed up with his ear-trumpet, a condition, says George known as QSET. Jest bought.

by Wren

was acquired by B.O.A.C. in 1954, becoming G-ANNT on the U.K. Register; it's certainly news to me that this aeroplane was owned by Howard Hughes prior to it being sold to B.O.A.C. According to my records, plus checking at least three other independent sources, this Constellation at the time of its sale to the U.K. concern was owned by T.W.A., registration being N6025C, its name being "Star of Colorado." When sold by B.O.A.C., it went to Capitol Airways Inc. and, so far as I'm aware, is still operated in the U.S.A., registered N4901C.

Special thanks to Mr. F. Zandvliet of K.L.M. Public Relations (Jly. 15) for correcting my data on the former K.L.M. Fokker F-22, PH-AJP, whose name I wrongly gave as "Roerdomp" instead of "Papegaai" although the aircraft's correct registration was recorded in my original letter!

Regarding Mr. Zandvliet's comments on the B.E.A. DC-3 G-AGHJ, I should like to assure him I was indeed well aware of all the former K.L.M. DC-3s shown in his detailed list, including their wartime U.K. registrations and post-1945 histories. Unfortunately, I omitted to insert the word "current" before the words "U.K. Register."

In conclusion, G-AGHJ has, in fact, been the "first" DC-3 on the U.K. Register since 1954, its R.A.F. serial was FD.867, it was built at Santa Monica early in 1943 as a C-47A-DO, CN.9413 and was acquired by B.O.A.C. the same year, going to B.E.A. on Aug. 1, 1946.

May I also thank Mr. David Jones (Jly. 8) for bringing up to date my notes on the veteran Viking, G-AHOP.

Nairobi, Kenya. D. M. POWELL.

[The difference between ownership by Howard Hughes and by T.W.A. is, in this context, academic. The majority of T.W.A.'s fleet is leased from Hughes, who has a 70% interest in the airline.—ED.]

Unique Civil Mosquitoes

MR. D. M. DAVIES' remarks in his letter "Icing Investigations" (Sept. 16) suggesting that the two B.E.A. Mosquitoes were unique in having obtained civil certification prompt me to ask whether the Mosquitoes operated by B.O.A.C. in 1944 on the Leuchars/Stockholm route had received similar certification. I made one trip, as a passenger, in one of these aircraft in August of that year and vaguely recollect that it bore a civil registration, but apart from this (and the temporary arrangements for carrying one passenger in the bomb-bay) it appeared to be a standard R.A.F. aircraft. The crew too seemed to be wearing a proportion of R.A.F. clothing, but presumably their sports coats and felt hats together with the civil registration letters on the Mosquito were sufficient to satisfy Swedish neutrality at that stage in the War.

As my first-ever flight, I shall not forget that trip. I will always remember the quiet efficiency of the B.O.A.C. staff in getting me into the bomb-bay, plugging in the oxygen and shutting the doors before I could ask about means of exit in an emergency!

Amersham, Bucks. H. M. BULL.

Gliding Notes

by Dr. A. E. Slater

A HEIGHT record from Pakistan has been set up by Flt. Lt. Colin Richardson, formerly of the London Gliding Club and now at the Pakistan Air Force College at Risalpur. He managed to get a lift by car to Quetta, where there is a gliding club run by Sqn. Ldr. J. Z. Mikulski, one of Poland's leading glider pilots in pre-War days.

There Richardson found himself in a basin 20 miles across, nearly surrounded by 12,000-ft. mountains. Dust devils started up at 11.00 hrs. but were too narrow to circle in, and there were terrific downcurrents between them. But by noon conditions were suitable for launch by auto-tow along a 4,000-yd. runway with a 75% probability of connecting with a thermal. Cumulus clouds, when present, had bases at 18,000 ft. He climbed to 22,000 ft. a.s.l. but his gain of height, though enough to qualify for Gold "C," was less than the 16,400 ft. needed to earn a Diamond.

* * *

THERE was a time when soaring flights in thunderstorms and other cu-nims were unusual events, and the greatest risk was that of losing control, subjecting the glider to structural failure and having to jump for it. Several pilots did so in a thunderstorm over the Wasserkuppe during the German national contests of 1938; one was afterwards hit by his sailplane, and another carried up instead of down by his parachute, lost two fingers from frostbite.

Nowadays, with good blind-flying equipment and airbrakes, cu-nim flights are commonplace, and their most disturbing feature appears to be electric shocks from lightning. But turbulence, hail and icing can also be unpleasant, as Flt. Lt. Brian Carroll found when he flew a Skylark 3b into a cu-nim near Bicester on Aug. 27 in search of "Diamond" height (5,000 metres, 16,404 ft.).

The unpleasantness drove him out of the cloud twice—the second time at 11,000 ft. Then, having sunk to 7,000 ft., he charged into a dark, thick shelf projecting from a thunderstorm, climbed at 12½ ft./sec., and was soon receiving electric shocks through the stick and pedals. Then came a severe shock which caused him to pass out for a few seconds.

Next the airbrakes became frozen in and the trimmer froze in such a position that he had to push hard on the stick to keep flying speed, what with the tail being heavy with ice and the wings badly iced as well. It took 20 minutes of straight flying to come out of the cloud. The barograph showed a maximum height of 16,000 ft.

On the same day some pilots at Lasham reached 11,000 ft., and the same height was reached next day by C. W. Bentson on a flight from Dunstable to St. Neots and back, just after passing Henlow on the return journey. His cu-nim lifted him at 33 ft./sec.

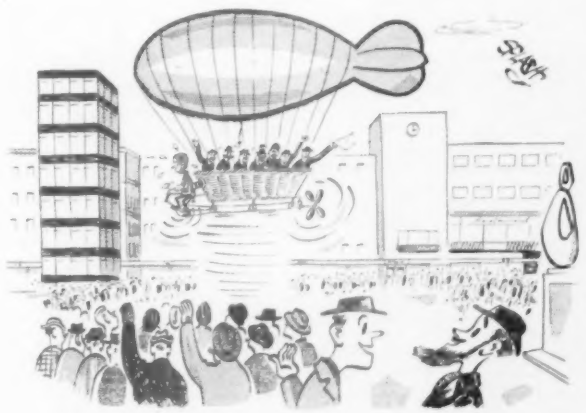
Cu-nims were again in use a week later, when on Sept. 4 Mike Fairman took a Skylark 3 to 10,700 ft. after release from tow at 700 ft. (above take-off) near Dunstable. A few miles to the west of the London club site is an elongated triangle between two airways to the N.E. and S.W. and the London control zone to the S.E. The wind was blowing along it, so Fairman got into his cu-nim at the sharp end near Wing and came out short of the blunt end near Cheddington.

* * *

"AUSTRALIAN GLIDING," now in its 9th year, has had so many requests to publish articles on light and ultra-light aeroplanes that the Editor, Allan Ash, rather than scandalize the purists by so doing, has started a new monthly magazine called *Airsport*. This, unlike *Australian Gliding*, is being run on a commercial basis; the latter has resumed publication after a four months' interval, and is being printed instead of lithographed, so as to save the Editor's time, though it costs more to produce.

* * *

EDMUND SCHNEIDER, the chief designer of the Grunau Baby, who emigrated to Australia after the War and started a glider factory near Adelaide, has returned to Germany to join Wolf Hirth's old firm, known as Schempp-Hirth. Martin Schempp, rather similarly, though at an earlier date, emigrated to the United States and then returned to join Hirth. The Australian factory will be carried on by Schneider's son, Harry.



"It may be slow but it's oh so quiet!"

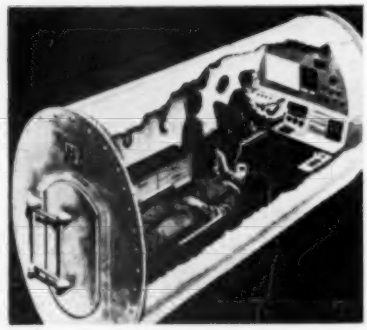
Aviation News in General

ILYUSHINS IN AFRICA.—It is reported that the Ghana Air Force is to have 14 Il-18s. To be flown by Russian crews and serviced in Moscow, these 14 Air Force transports are in addition to the four Il-18s that Ghana Airways are reported to be acquiring. At present, the Ghana Air Force has 16 Hindustan trainers and 15 pilots under training.

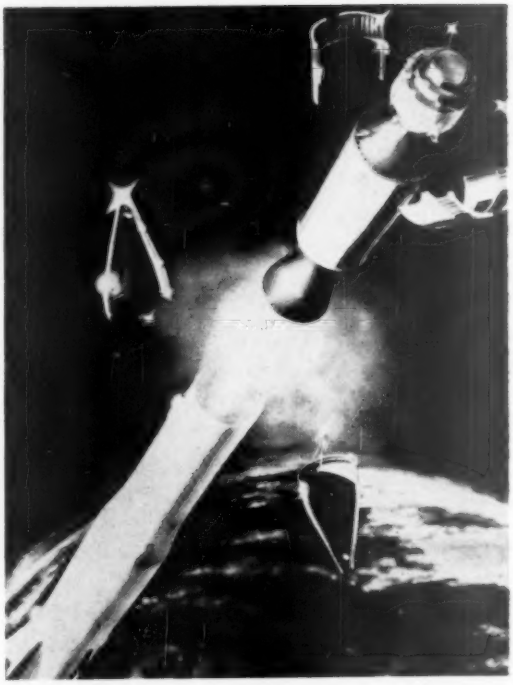
HERONS FOR CEYLON. — Two Herons have recently been added to the strength of the Royal Ceylon Air Force. They were delivered in company with one of the six Doves operated by the R.C.A.F., which had been under repair.

AID FOR GUATEMALA.—A correspondent reports that Guatemala has taken delivery of ten Douglas B-26s from the U.S. Three military airfields capable of handling the largest jet aircraft are to be built in Guatemala by the U.S.; the first is already under construction in the province of Peten.

MAGISTER IN SWEDEN. — A development prototype of the Potez-Air Fouga Magister, powered by 1,060-lb.s.t. Turboméca Marboré VI engines, was recently demonstrated in Sweden. It is designated CM.209.



SPACE SIMULATOR.—Two U.S.A.F. pilots have recently completed 30½ days in a space cabin simulator. Designed and built by Minneapolis-Honeywell, the capsule measures 12 ft. by 8 ft.



INTO THE BLUE.—A four-stage Blue Scout was launched from Cape Canaveral on Sept. 21 to send research instruments to a height of 16,000 miles. This drawing shows how the second and third stages separate. Technique could locate safe areas for high-altitude nuclear tests or help in detecting nuclear explosions by other nations. First test was frustrated by a telemetering failure. It was the first of 12 firings to include also the launching of Earth-satellites and model boost-gliders as part of the Dyna-Soar programme.

PROBE FAILURE.—An attempt to launch Pioneer VI into orbit around the Moon (perigee 1,500 miles, apogee 3,000 miles) failed on Sept. 25 when the Atlas-Able rocket developed a fault in the second stage. Probe was an aluminium-alloy sphere 39 in. in diameter and weighing 380 lb. It had four paddle-like solar cells and would have been spin-stabilized by small hydrazine mono-propellent rockets pointing both fore and aft. Engine could be fired four times to increase velocity and twice to decrease it. Probe and terminal stages re-entered the Earth's atmosphere and burnt up.

MORE AVRO 748s.—According to Mr. J. A. R. Kay, A. V. Roe has decided to proceed with component manufacture for a batch of 60 Avro 748s. This doubles the quantity previously committed by the management. Firm orders for the 748 total 12, including one set of parts for assembly in India.

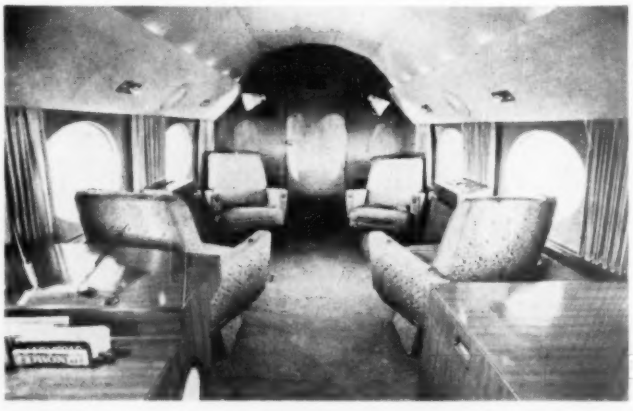
PIAGGIO OPERATIONS. — The pusher engine installation of the Lycoming GSO-480 engines in the Piaggio P.166 as operated by Papuan Air Transport (Patair) in New Guinea and Papua, have recently been officially cleared by the Australian Department of Civil Aviation for operation in temperatures at I.S.A. plus 25° C.

TEST PILOTS' FORUM.—The fifth annual test pilots' forum organized by the London Society for Air-Britain will be held on Oct. 5 in the Lancaster Room of Caxton Hall, London, S.W.1, at

GULFSTREAMS TO BE SOLD IN EUROPE

APPOINTMENT of Hughie Green, TV personality and pilot, and Mr. John Slade, aviation executive, as vice-presidents of Atlantic Aviation's new European office in London, was announced earlier this week. This new organization, known as Atlantic Aviation Export Corporation, will be distributors for the Grumman Gulfstream executive aircraft powered by two Rolls-Royce Darts.

A demonstration aircraft is scheduled to reach the U.K. in November and will make three overseas sales tours—to the Continent, the Middle East, and Africa. Besides Dart powerplants, the Gulfstream embodies much British equipment. Companies involved include: Vickers, Dowty Exports, Sir George Godfrey and Partners, Ltd., Vokes, Ltd., Lucas Rotax, Ltd., Plessey Co., Ltd., Teddington Aircraft Controls, S. Smith, Dowty Rotol, Newton Bros. (Derby), Ltd.



19.00 hrs. Under the chairmanship of Mr. H. G. Hazelden, members of the forum will include Sqn. Ldr. Ron Gellatly, Mr. S. B. Oliver, Sqn. Ldr. Ted Tennant and Mr. Bill Aston. Two films will also be shown.

TRANSIT AGAIN.—Another double-satellite comprising a Transit IIIA navigational satellite and a smaller research satellite is scheduled for launching from Cape Canaveral in November. The new Transit will carry a "memory" device for receiving and transmitting orbital parameters.

SKY SPY.—At the recent U.S. Air Force Association convention in San Francisco, Lt.-Gen. B. Schriever, head of Air Research and Development Command, said that the first launching of the Lockheed Samos reconnaissance satellite would take place "before November."

NEEDLED.—U.S.A.F. proposal to orbit a cloud of "needles" to function as a reflecting umbrella for radio signals has been severely criticized by international radio and radar experts. Project is part of U.S.A.F.'s studies for a global communications network under WS-480L.

RE-ENTRY PARASOL.—Confirming our report last week ("Getting a man into space"), the U.S.A.F. has awarded Avco Corporation a £2.1m. contract to develop the parasol drag brake as part of the Samos project. Capsule may be big enough to accommodate a man in operational system.

SPUTNIK IV.—The final stage of the Sputnik IV rocket burned up over the Pacific Ocean on Jly. 17. Separated components of the satellite itself—which carries a "dummy" astronaut—are still in orbit.

Commercial Aviation Affairs

U.K.-JAPAN TALKS.—A series of consultations between the aviation authorities of the U.K. and Japan were concluded satisfactorily on Sept. 22. Subjects included J.A.L.'s projected Arctic and eastern route services (see last week's issue, p. 442), the expansion of B.O.A.C.'s services (see below) and the development of regional operations in the Far East.

B.O.A.C. PACIFIC PLANS.—Following conclusion of the talks in London between U.K. and Japanese authorities (see above), B.O.A.C. announced that it would introduce Boeing 707s on the London-New York - San Francisco - Honolulu-Tokyo - Hong Kong route on Dec. 8, at the same time increasing the service frequency from two to three a week. A fourth 707 service will operate the trans-Pacific sector only each week. Total journey times will be 30 hr. 45 min. from Hong Kong, and 36 hr. 45 min. to Hong Kong, where the 707 will link with the "east-about" Comet services to London. Boeing 707s will start serving San Francisco twice a week from London on Oct. 20.

CUNARD EAGLE.—The scheduled first-class and economy service to Bermuda and Nassau by Cunard Eagle, using a Britannia 310, will be inaugurated on Oct. 15. Services will operate once every other week until Jan. 7, and weekly thereafter.

NEWS FROM CEYLON.—Russia is reported to have offered aircraft to Ceylon on a long-term loan basis or for barter for goods from Ceylon. A nine-month training course for Sinhalese pilots is also offered. At present, Sinhalese pilots fly the domestic and regional services of Air Ceylon; international services are operated by chartered K.L.M. Constellation (Electra from November) with Dutch crews. Dissatisfaction with the way Air Ceylon was being run recently led to the resignation of Mr. P. Nadesan, the chairman, and Mr. J. L. M. Fernando, the manager.

AVIANCA JETS.—Avianca, the Colombian airline which is to take delivery of two Boeing 720Bs next summer, is advertising jet service between Jamaica and Bogota from Oct. 17. Two Boeing 707s will be leased from Pan American for this service.

QANTAS ALL-CARGO.—A second weekly all-freight service between London and Sydney is to be started by Qantas later this year. The present service, introduced last November, operates via Singapore; this additional service will fly via Hong Kong.

SIMPLIFIED APPROACH LIGHTS.—The F.A.A. has ordered from Sylvania Electric Products an experimental simplified low-cost approach-light system for use at small airports. The system, due to be installed for trials at Atlantic City by Nov. 15, extends 1,500 ft. from the runway threshold.

FARE DECISIONS.—IATA's annual Traffic Conferences began in Cannes on Sept. 19 and will continue into October. No major changes are expected in the general passenger fares to be considered by the conferences.

JETS TO AUSTRALIA.—T.A.I. inaugurated its weekly DC-8 service between Paris, Sydney and New Caledonia on Sept. 20. K.L.M. will fly a DC-8 to Sydney on Oct. 4 on a proving flight for a regular service.

ETHIOPIAN DEVELOPMENTS.—Bids are being called for a programme of airport development in Ethiopia. In addition to runway developments at the new Addis Ababa airport and at Asmara—both of which will be used by Ethiopian Airlines' two Boeing 720Bs from the beginning of 1962—the programme involves improvements and building work at various other of the country's airports.

MAKING AIRPORTS PAY.—San Francisco International earns more money from cars than from aircraft. During the past year, parking, car rental concessions and taxi and limousine operators brought in $1,235,000 while landing and take-off fees netted only $950,000.

I.L.O. DISCUSSION.—An *ad hoc* meeting, organized by the International Labour Office, is being held in Geneva from Sept. 26 to Oct. 7, to consider conditions of employment in civil aviation and hours of duty and rest periods for flight personnel. Mr. H. F. Rossetti, deputy secretary of the Ministry of Labour, has been appointed chairman. A six-man U.K. delegation includes delegates from the Government, from employers and from workers and includes members of the M.o.A., B.E.A., B.A.L.P.A., and the M.N.A.o.A.

ACCIDENT CAUSE.—A report on the inquiry into an accident to a D.H. Rapide last July in which eight well-known Danish football players were killed, blames the pilot for unsatisfactory instrument flying in marginal weather. The Rapide stalled shortly after take-off from Copenhagen Airport in "unusually heavy rain."

News About People

Gp. Capt. F. R. Carey, who, as recorded below, has become the Rolls-Royce sales representative in Australia.

ROLLS-ROYCE SALES.—Gp. Capt. F. R. Carey has been appointed sales representative in Australia of the Aero Engine Division of Rolls - Royce. Appointed Air Adviser to the United Kingdom High Commissioner in Australia in 1958, he retired from the R.A.F. in June of this year.

T.C.A. APPOINTMENT.—Mr. J. G. Maxwell has been appointed sales manager, overseas, for T.C.A. and is making his headquarters in London. He joined T.C.A. in 1939 and has been regional sales manager, based in Montreal, since 1946.

F.A.A. APPOINTMENT.—Col. Aldro Lingard, U.S.A.F., has been appointed acting chief of the test and experimental division of the F.A.A. Bureau of Research and Development. Until recently he was director of plans and programmes for U.S.A.F.E. Headquarters in Germany.

RETIREMENT.—Capt. C. D. Schermuly, D.C.M., is retiring as managing director of The Schermuly Pistol Rocket Apparatus, Ltd., as from today. He is to remain chairman of the company, and Mr. A. J. Schermuly and Mr. H. C. Fairbrother are to act as joint managing directors.

MR. GEORGE ARCHER.—We regret to record the death on Sept. 20, after a prolonged period of indifferent health, of Mr. George Archer, C.M.G., president of The Mond Nickel Co., Ltd. He assumed this appointment only two months ago, having been chairman of Mond Nickel and of Henry Wiggin and Co., Ltd., since July, 1959. He joined the board of Mond Nickel in 1948, having served with the Ministry of Supply during the War. He became Mond sales director in 1952 and managing director in 1955.

Industry Record

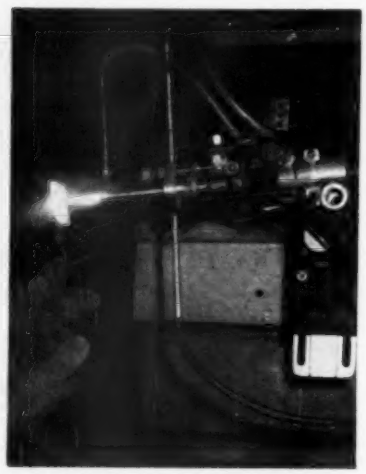
New Aluminium Treatments

A new range of treatments for aluminium and aluminium alloys has been introduced by The Pyrene Co., Ltd. It comprises three Bonderite processes —701, 710 and 740—and Aluma Etch 391.

The Bonderite 701 process converts the aluminium surface into an amorphous oxide-chromate coating of a pleasant green colour which is integral with the metal and is light-fast. Bonderite 710 coatings are of golden colour though variations in tone may occur according to the different alloys used.

Bonderite 740 is another oxide-chromate treatment providing a coating which is both an ideal base for organic finishes, and a corrosion resistant film in its own right. It can be applied by immersion, spray or in a continuous strip line. It has been specially developed for treating aluminium and aluminium alloys in mixed production with steel.

Aluma Etch 391 is a scale free, controlled alkaline aluminium etchant for uniformly etching the surface of aluminium in an immersion bath. Unlike other etching solutions where dissolved aluminium reacts with caustic soda to form insoluble sodium aluminate, the composition of Aluma Etch prevents the conversion of sodium aluminate into sludge. The use of Aluma Etch therefore is stated to produce no suspension and no precipitate.



NEW TORCH.—This plasma-jet high-temperature torch developed by British Oxygen Research and Development, Ltd., is particularly suitable for applying coatings having a high melting point or for spraying reactive material.

Anglo-American Agreement

The Lear-Romec Division of Lear Incorporated is to manufacture under licence the full range of Plannair blowers for use in the United States and Canada, particularly in the aircraft industry. This agreement follows the recent return of Mr. V. A. Kennett, joint managing director of Plannair, Ltd., from a vist to North America.

Aircraft Instrument Wire

An addition to the range of P.T.F.E. insulated instrument wire has been announced by the Radio and Electronic Components Division of Associated Electrical Industries, Ltd. Classified as type A, it joins type B introduced last year, and conforms to Ministry of Aviation Specification EL 1930.

Basically for use in instruments and equipment, the new wire is stated to be of particular interest to aircraft manufacturers. It is recommended for use at voltages up to 350 v. and where conductor temperatures of between −75° C. and 250° C. are experienced. P.T.F.E. insulation is lapped on to single or stranded annealed copper wires, each silver plated to a radial thickness of not less than 0.00003 in. In the case of type B, the P.T.F.E. insulation is extruded over the wire.

Finish is available in 11 different colours, or alternatively in multi-striped tracing.

Publications Received

Enemy Aircraft of World War II. By K. G. Munson. Provides a quick reminder of the types of German and Italian aircraft which, 20 years ago, confronted the R.A.F.—a useful collection of photographs and data. 64 pp.; 4¼ in. by 7¼ in. Illustrated. Ian Allan, Ltd. Price 2s. 6d.

Design for Flight. By Heinz Conradis. The instructive biography of Prof. Kurt Tank, one of Germany's outstanding aircraft desginers, translated by Kenneth Kettle. The author was closely associated with Tank on the Focke-Wulf design team and writes authoritatively of that company's products for which Tank was primarily responsible. 246 pp.; 5¼ in. by 8¼ in. Illustrated. Macdonald and Co. Price 21s.

Claude Grahame-White. By Graham Wallace. The life and times of an early aviator who did much to popularize aviation in England; a well-told account based on the subject's own notes and recollections. 256 pp.; 5¼ in. by 8¼ in. Illustrated. Putnam and Co., Ltd. 35s.

Some of the Few. A collection of 24 portraits of Fighter Command pilots by Cuthbert Orde, selected from 150 such drawings which he made at the height of the Battle of Britain; the accompanying biographical notes are by John P. M. Reid. 60 pp.; 5¼ in. by 8 in. Macdonald and Co. (Publishers), Ltd. Price 5s. Royalties will be paid to the R.A.F. Benevolent Fund.

The Years of the Sky Kings. By Arch Whitehouse. An account of the aircraft, pilots and air fighting of World War I by the well-known ex-R.F.C. gunner and pilot and author of air adventure stories. 336 pp.; 5¼ in. by 8¼ in. Illustrated. Macdonald and Co. Price 25s.

Baa Baa Black Sheep. By Col. Gregory ("Pappy") Boyington. The autobiography of a U.S. Marine Corps pilot, recounting his experiences with the Flying Tigers in China, as commanding officer of the U.S.M.C. "Black Sheep" squadron in the South Pacific and as a Japanese P.o.W. for 20 months. Interesting insight into the character of an unconventional but widely known American hero. 384 pp.; 5¼ in. by 8¼ in. Putnam and Co., Ltd. Price 21s.

Fundamentals of Rocket Propulsion. By Raymond E. Wiech, Jr., and Robert F. Strauss. Starting with a short but concise history of the rocket engine, this book goes on to study in detail all aspects of rocket engine design and operation and discusses their place in space research. The authors are supervisors in Reaction Motors' Research Group. 152 pp 6¼ in. by 9¼ in. Illustrated. Chapman and Hall. Price 44s.

Aviation Calendar

Oct. 1

London.—British Interplanetary Society lecture, "The N.A.S.A. Space Flight Programme," by Morton J. Stoller, in York Hall, Caxton Hall, Caxton Street, S.W.1, at 18.30 hrs.

Oct. 3

Istanbul.—AGARD 16th meeting of the Aero Space Panel; until Oct. 8.

Istanbul.—AGARD 4th Avionics Panel Symposium on "Radio Navigation"; until Oct. 9.

Oct. 4

Derby.—British Interplanetary Society Midlands Branch Lecture, "Aims of Space Research," by L. J. Carter, at the Seven Stars Inn, King Street, at 19.30 hrs.

Oct. 5

Weybridge.—R.Ae.S. Branch lecture, "Inertial Navigation," by J. E. Pateman, at the Apprentice Training School, Vickers-Armstrongs (Aircraft), Ltd., at 18.00 hrs.

Oct. 6

Istanbul.—Tenth AGARD General Assembly; until Oct. 7.

Bristol.—British Institution of Radio Engineers convention on "Aviation Electronics and its Industrial Applications," at College of Science and Technology, Ashley Down Road; until Oct. 7.

Oct. 11

Folkestone.—Aerodrome Owners Association Annual Conference, at the Grand Hotel; until Oct. 12.

Oct. 12

Brighton.—Institution of Production Engineers Conference on "Modern Trends in the Manipulation of Metals"; until Oct. 14.

Hull.—R.Ae.S. Brough Branch discussion, "An Air Bridge for Hull," introduced by M. G. K. Byrne, at the Royal Station Hotel, at 19.30 hrs.

Oct. 17

Derby.—British Interplanetary Society Midlands Branch lecture, "The Planet Jupiter," by W. E. Fox, in the Seven Stars Inn, King Street, at 19.30 hrs.

Oct. 18

Bournemouth.—Guild of Air Traffic Control Officers 3rd Air Traffic Control Convention at the Town Hall; until Oct. 19.

Oct. 19

Southend.—R.Ae.S. Branch Lecture, "Rocket Engines," by L. S. Snell, in Room 3, Engineering Dept., Municipal College, London Road, at 19.30 hrs.

New Patents

APPLICATIONS ACCEPTED

853,649.—**Nord-Aviation Soc. Nationale de Constructions Aéronautiques.**—"High-lift devices for aircraft."—Nov. 14, 1958. (Mar. 10, 1958.)

853,674.—**Short Bros. and Harland Ltd.**—"Fault detection in servo control systems."—Jan. 21, 1958. (Feb. 7, 1957.) (Cognate application 28906, Sept. 13, 1957.)

853,450.—**Boeing Airplane Co.**—"Reversible thrust jet engine nozzle."—Sept. 2, 1958.

853,497.—**Pye, Ltd.**—"Guided missiles."—Jan. 7, 1957. (Jan. 5, 1956.)

Printed specifications of the above will be available on Nov. 9, 1960, and the opposition period will expire on Feb. 9, 1961.

Company Notices

NEW COMPANIES

AIR-LOG, LTD. (669,183).—Private co. Reg. Sept. 2. Cap. £1,000 in £1 shs. Business of designing, improving, manufacturing, purchasing, assembling and selling ground support equipment for use in connection with aviation. Sols.: Slaughter and May, 18 Austin Friars, E.C.2.

GRANTAIR, LTD. (669,251).—Private co. Reg. Sept. 5. Cap. £100 in £1 shs. Manufacturers of, dealers in, and hirers of aeroplanes. Sec.: Olive E. Yates. Sols.: Wild Hewitson and Shaw, Cambridge. Reg. off.: High Street, Grantchester, Cambs.

CHANGE OF NAME

HUNTING AEROSURVEYS (HOLDINGS), LTD. (456,447). 4 Dunraven Street, W.1. Name changed to Hunting Surveys (Holdings), Ltd., on Mar. 30, 1960.

Personal Notices

BIRTHS

Bacon.—On Sept. 14, at R.A.F. Hospital Ely, to Jean, wife of Flt. Lt. G. McA. Bacon—a daughter.

Besley.—On Sept. 14, at R.A.F. Hospital, Nocton Hall, Lincoln, to June (*née* Turton), wife of Flg. Off. John Besley—a son.

Bullers.—On Sept. 9, at Sylt, Germany, to Sheila (*née* Pendleton), wife of Flt. Lt. Roy Bullers—a son.

Edwards.—On Sept. 5, to Kathleen, wife of Flt. Lt. A. J. Edwards—a daughter.

Hall.—On Sept. 16, at R.A.F. Hospital, Wegberg, Germany, to Ann (*née* Popie), wife of Flt. Lt. G. T. Hall—a son.

Martin.—On Sept. 16, at Orchard Cottage, High Street, Sandhurst, Berks, to Mavis (*née* Webb), wife of Flt. Lt. H. V. Martin—a son.

DEATH

Richardson.—On Sept. 16, Air Vice-Marshal Sir Victor Richardson, K.B.E., C.B., M.D., R.A.F. (Retd.).

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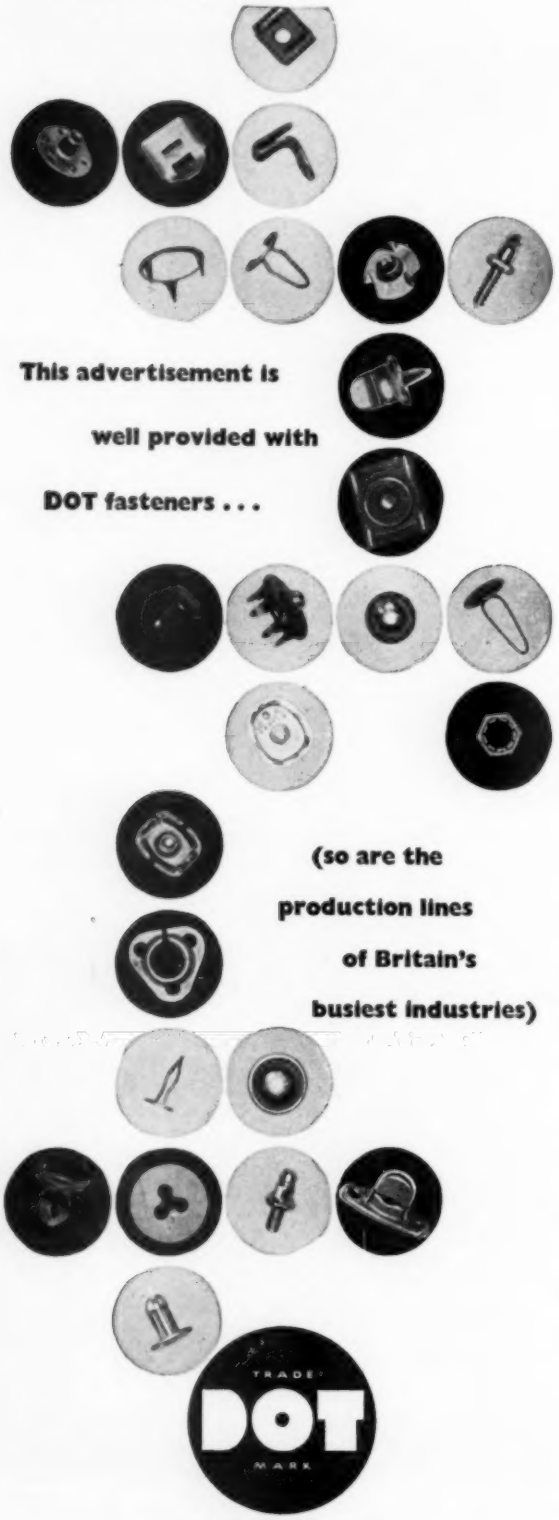

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- ★ LEAR 12-D A.D.F.
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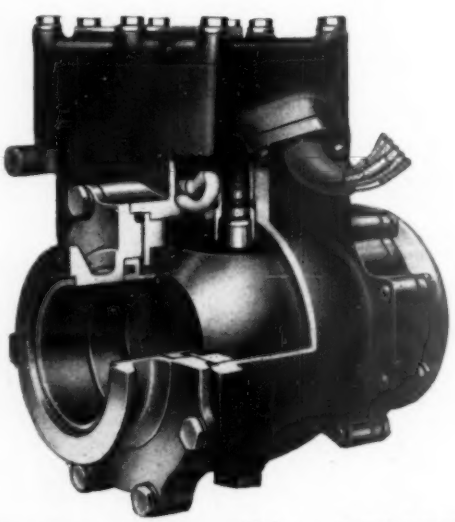

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RATES—1/- per word (minimum 12 words 12/-). Each paragraph charged separately and name and address must be paid for. Semi-displayed setting £3-17-6 per single column inch. Centred lines 22/6. Series discounts of 5% for 13, 10% for 26 and 15% for 52 consecutive insertions allowed to trade advertisers.

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JACKAROO (4-seater), G.M.1 engine, 34 s.c.o., 12 months' C. of A., Ref. 3081, £1,300.

JACKAROO (4-seater), G.M.1 engine, 130 s.c.o., C. of A. 12.8.61, Ref. 3083, £1,000.

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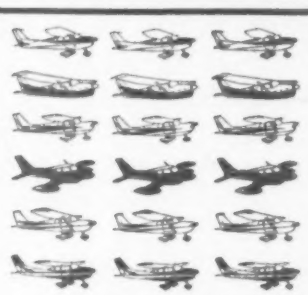

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NOTICES

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM OVERSEAS AVIATION (C.I.), LTD., OF 6 YORK STREET, ST. HELIER, JERSEY, C.I.:—

APPLICATION NO. 4488 for an All-freight Service with Viking Aircraft, on the route Northampton (Sywell)-Eindhoven-Hamburg at a frequency of one return flight daily for seven years from the date of approval.

FROM EAST ANGLIAN FLYING SERVICES, LTD., OF SOUTHEND AIRPORT, ESSEX:—

APPLICATION NO. 4/11 for an amendment to the terms of approval of the U.K. Internal Service which they are authorized to operate with Rapide, Dakota, Heron, Dove, Bristol 170 and Viking aircraft on the route Ipswich-Southend-Rochester-Shoreham-Alderney-Guernsey-Jersey, at a frequency in accordance with traffic demand until March 31, 1967, provided that the total passenger capacity in each direction each year, does not exceed 1,480 seats weekly during July and August, 1,280 seats weekly during June and September and 1,080 seats weekly from October to May (half the capacity being allowed to be operated on the sector Shoreham-Guernsey and/or Jersey), so as now to enable them from June to September each year to carry 2,000 passengers weekly in each direction.

FROM DERBY AVIATION, LTD., OF DERBY AIRPORT, BURNASTON, DERBY:—

APPLICATION NO. 659/1 for an amendment to the terms of approval of the seasonal U.K. Internal Service which they are authorized to operate with Marathon aircraft on the route Derby-Nottingham (Tollerton) (opt.)-Elstree (opt.)-Isle of Wight (Bembridge), at a frequency of four return flights daily from April to September, each year, until September 30, 1962, so as to enable them to operate also with Heron aircraft on the amended route Derby-Nottingham (Tollerton) (opt.)-Luton (opt.)-Isle of Wight (Bembridge).

APPLICATION NO. 1054/1 for an amendment to the terms of approval of the U.K. Internal Service which they are authorized to operate with Marathon and Dakota aircraft, on the route Oxford (Kidlington)-Southampton (Eastleigh) (tech.)-Jersey, at a frequency of two return flights on each Friday, Saturday and Sunday, plus four return flights weekly from Mondays to Thursdays inclusive, until May 31, 1964, so as to enable them to operate on the amended route Oxford (Kidlington) and/or Swindon (South Marsden-Southampton Eastleigh) (tech.)-Jersey.

FROM THE BRITISH OVERSEAS AIRWAYS CORPORATION, OF LONDON AIRPORT, HOUNSLOW, MIDDLESEX:—

APPLICATION NO. 2287/1, for permission for seven years from November 1, 1960, to extend to Doha (opt.), the Normal Scheduled Service which they are authorized to operate on reserved route No. 10, London-Kuwait and/or Bahrein.

These applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. 554-1

APPLICATIONS are now being considered to appoint Area Dealers for Umbaugh Rotary Wing Aircraft. Apply, Holman and Co. (Engineers), Ltd., 183 Fordneuk St., Glasgow, S.E. 554-9

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MAITLAND DREWERY AVIATION, LTD., have vacancies for Viscount Captains and First Officers, Senior Engineer (Viscounts), Operations Manager and Traffic Officer. All applicants must have previous experience appropriate to the situation for which they apply. Applications should be in own handwriting, giving the fullest information, and forwarded to Managing Director, Maitland Drewery Aviation, Ltd., 128 Station Rd., Sidcup. 555-9080

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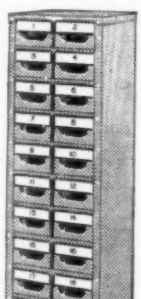

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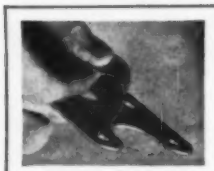

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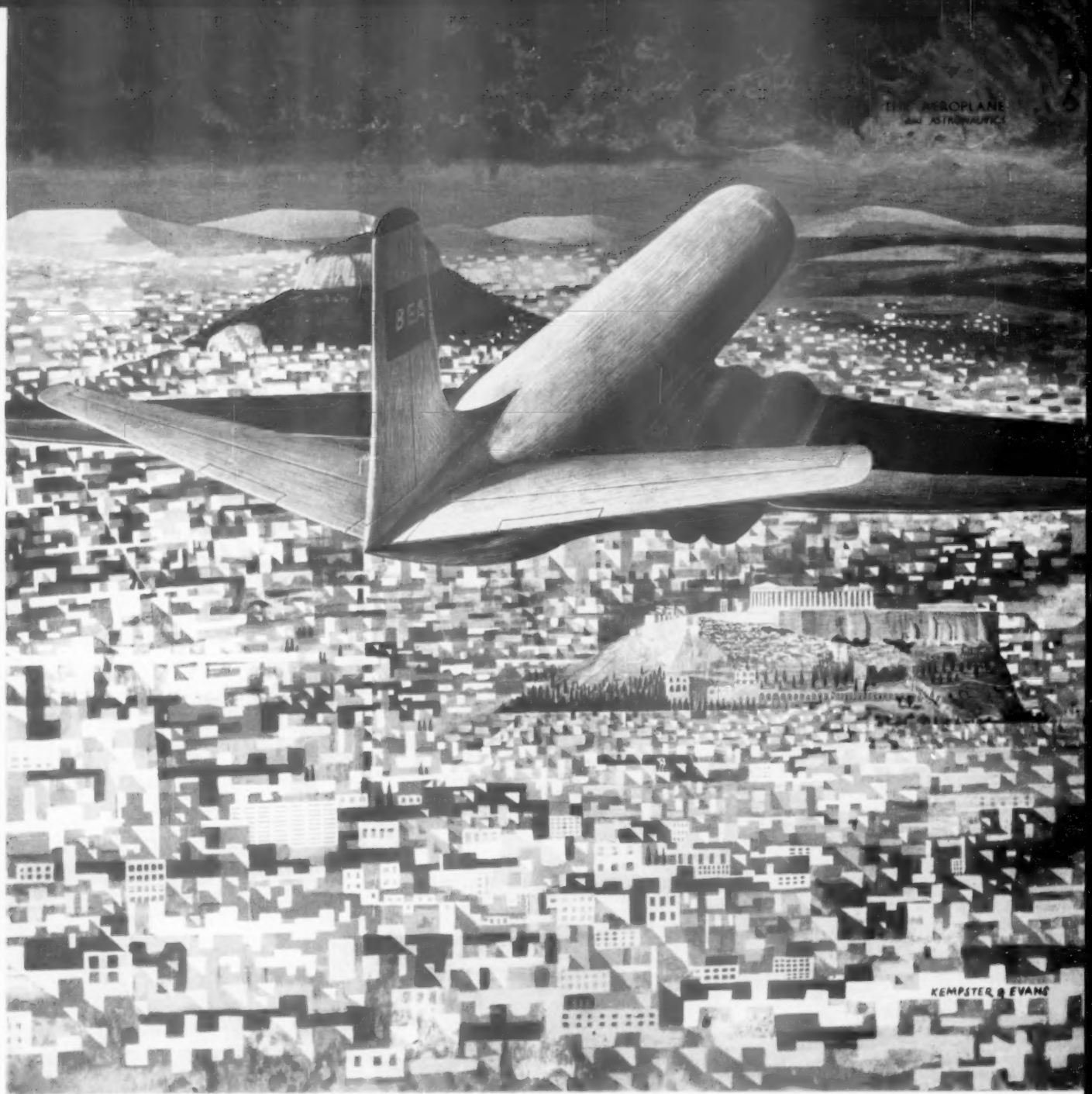

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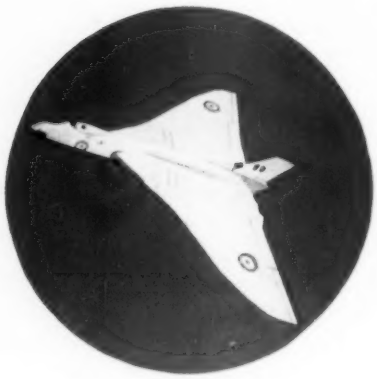

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